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Lighting Installation in Furniture Factory Which Paid for Itself by Results Secured.

Timely Aspects of Factory Lighting

Maximum Production in Face of Shortage of Labor Dependent on Adequate Industrial Lighting—Elimination of Spoilage Another War Problem

By J. J KIRK

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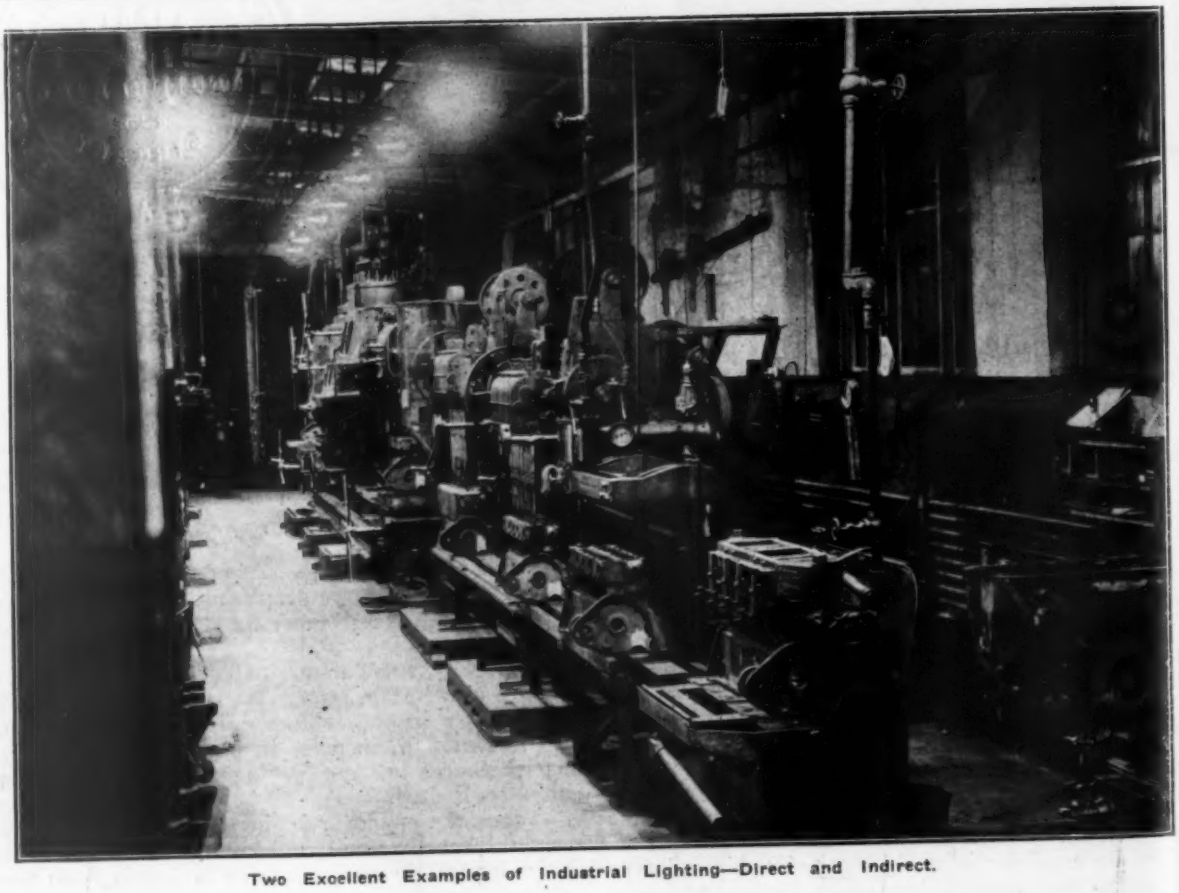
THE shortage of labor in almost all lines of industry constitutes one of the real problems growing out of the great war. There is scarcely a plant that has not been affected, thus making necessary the conservation in every way possible, during this crisis, of the brain and physical ability of our men and owmen. Every factory under present conditions must secure maximum output with minimum waste of every kind.

The subject of efficient industrial lighting which is of vital importance is frequently overlooked by the industries in the mad rush to increase production. While the employer is busily engaged in his endeavor to increase the output of his factory, he is overlooking one of the most essential factors in such a result.

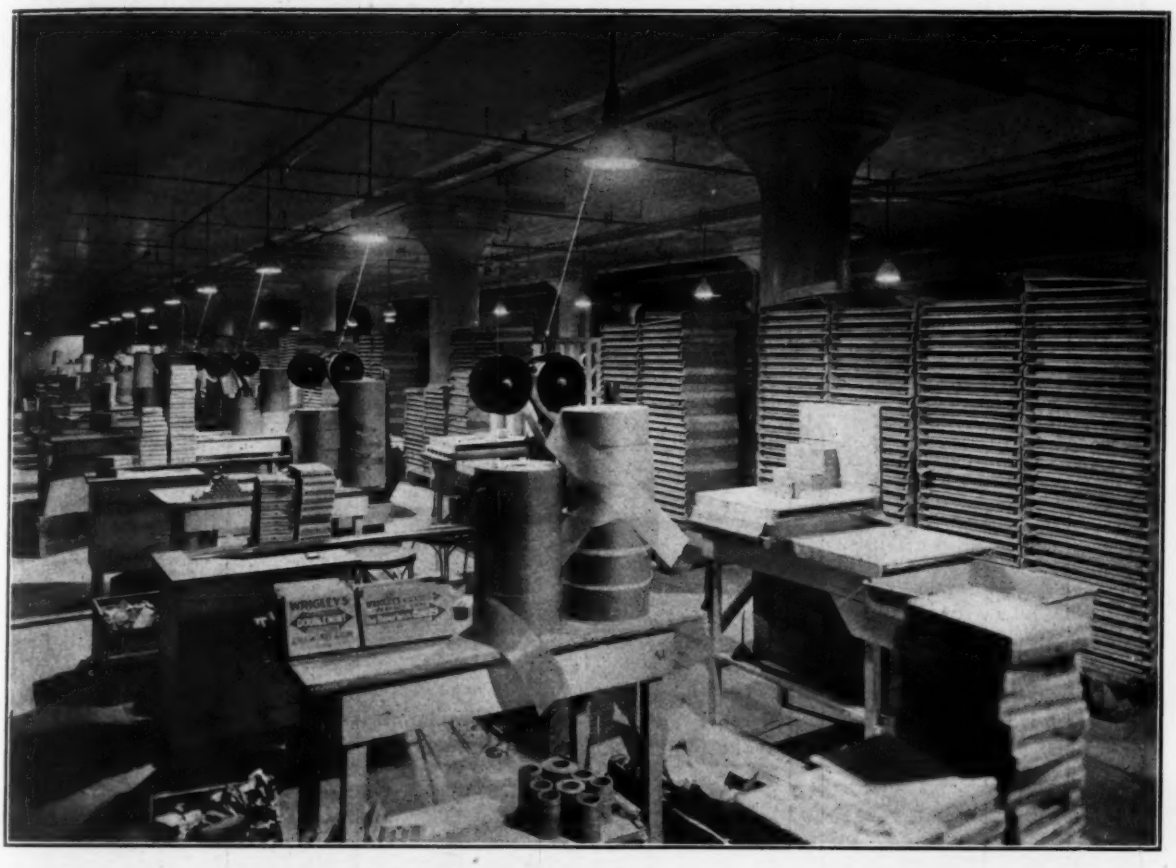
Without increasing the size of the factory working rooms, he crowds more people into the same space occupied by employees before the demand for increased production becomes vital.

Naturally, for a time, production increases, but is stopped at a certain point. He begins to wonder why the increase in output does not continue to advance in proportion to increase in payroll. He finds that his employees are not working efficiently and their output is limited.

When the employer begins to investigate he finds the workmen tires more quickly than he should. Calling a few of the workers aside he learns from them what the trouble is, they complain of headaches and as a result they have less incentive to work.



Two Excellent Examples of Industrial Lighting—Direct and Indirect.



A Noticeable Increase in Production Resulted From These Installations.

They tell him about the sensation of fatigue and the lack of initiative to do either mental or physical labor. Mental or nervous fatigue may spring from the maintained use of intelligence and observation with a varying degree of necessary muscular activity, or from the steady attention maintained upon one skilled task, or of distributed attention, as when several machines are to be attended.

Or, again, it may depend upon the continued use of special senses and sense-organs in discrimination as by touch or sight.

These ideas give the employer something to think about, and for the first time perhaps he seriously considers the question of suitable working conditions. He finds that a considerable number of his employees are forced to work in parts of the room where adequate lighting has not been provided.

Results of Good Lighting.

A trial installation of efficient factory-lighting equipment is installed. What is the result? The complaints of the workmen cease, production increases and the employer is beginning to realize his desired goal.

There is also an indirect result, due to good lighting, namely its value in securing and holding good operators. The good workman prefers to work in a well lighted plant, because it means better surroundings—better working conditions—and it affords him a better chance to do his best.

A factory workman, to perform his task swiftly and well, must be able to see clearly. When daylight is available, the factory should be flooded with it. The walls should be painted white, or a light color: a dark factory decreases the illumination at least 10 per cent under the best conditions of lighting.

It has been found that if a machine is painted gray—a sort of battleship gray—it will reflect 30 per cent of the light, and furthermore the workman will take more pride in his machine and his work. When daylight fails, particularly during the fall and winter months, the best artificial illumination is inexpensive, if it saves even a few minutes of the workman's time that would be lost through inadequate lighting.

The fundamental principle of good industrial lighting is a recognition of the fact that light sources are a means to an end and not the end itself. Good lighting is that which produces good seeing. In order that light may produce this effect, the filament of the lamp must not come within the line of vision.

Notwithstanding the fact that when the everage factory manager appreciates the handicaps he is placing over his workmen with regard to safety and output he will continue to light his factory according to obsolete methods simply because the workmen have become accustomed to local lighting located immediately in front of and close to their work. In the majority of installations of this character no reflector equipment is provided to protect the eyes. The lamp may be fitted with a wire guard, which prevents breakage, but offers no protection to the eyes. From this it might almost be inferred that the breakage of an inexpensive lamp is considered of more importance than an inquiry to the workmen's eyes—organs that

Assembly Department of Motor Factory Equipped With 100-Watt Lamps.

An Installation in Chicago Which Speeded Production.

are irreplaceable at any price, and which are the greatest protection against accidents that may befall mankind.

A Typical Illustration.

The plant of the Horn Brothers Manufacturing Company, of Chicago, offers a good example of the value of good artificial lighting and its relation to factory output. The original lighting system was found to be inadequate under the demand for increased production and the spoilage, especially during the later part of the day, became excessive. Each morning considerable time was spent correcting the mistakes of the preceding evening. But it was not until one of the factory lighting specialists of the local central-station company pointed out the cause of their high spoilage that the managers realized that it could be prevented by a properly designed lighting system.

William F. Horn, of Horn Brothers Company, in a letter to the central-station company, says: "Since installing your modern system of electric factory lighting we do not see how we got along with the old system as long as we did." He further states that the factory production has been increased 10 per cent, and spoilage has been entirely eliminated. All this he claims to be due directly to the better artificial lighting conditions in the plant.

The installation, as completed, consists of five 200-watt Mazda "C" lamps, 43 100-watt Mazda "C" lamps, 63 60-watt Mazda "B" lamps, and three 25-watt Mazda "B" lamps. Each unit is equipped with a deep-bowl reflector and is suspended approximately nine feet from the floor. The installation, as planned, gives a localized general system of lighting. By this arrangement adequate light is provided at the machines and other places where work is actively carried on, while places used for storage are sufficiently illuminated to prevent accidents.

The foregoing example illustrates the value of providing proper lighting for the workman, if the manufacturer would improve the quantity and quality of his product.

A report made on a large, though typical manufacturing district, showed that less than 25 per cent of the factories visited had adequate systems of artificial lighting, and a majority of these were brought to an appreciation of the commercial, as well as the humanitarian, value of a proper system of artificial lighting by the activities of a lighting expert.

Government Investigating Platinum in Alaska—Supply Short.

Four attaches of the United States government are spending this season in Alaska, investigating as to the extent of platinum discovered some time ago in that territory, with instructions to report on the possible supply of that metal. The most important discovery was made by Dr. H. C. Parker, of New York, who reported platinum in considerable quantity in gravel on Kahiltna River, where dredging for placer gold was going on. The output of platinum in the United States has not exceeded 750 ounces per annum, which ordinarily is far less than domestic demands; the additional supply has heretofore come from the Ural mountain mines in Russia, which has produced about 300,000 ounces per year. Since the beginning of the war this supply has been practically cut off, and the demand for platinum in the United States has greatly increased. The available supply in this and other countries is reported seriously short, and the price has advanced to $105 per ounce.

The important uses for platinum, for which a depletion of supply is felt, is for telephone and telegraphic instruments, for the completion of contact points in the ignition systems.

The Relation of Lighting to Industrial Safety

Close Connection Between Poor Lighting and Industrial Accidents—Conservation of Employees' Eyesight by Good Lighting Results in Reduction of Accidents and Increase of Efficiency

By JOHN A. HOEVELER

Illuminating Engineer, Industrial Commission of Wisconsin.

IN OUR modern complex social order, three elements are needed to produce wealth—land, labor and capital. Land—natural resources, such as timber, ore, coal, oil, fertile soil, vegetation, animal life, water power—and labor alone suffice in a more simple stage of civilization. Without land, labor is powerless to create wealth, to satisfy human wants, "For land is the habitation of man, the storehouse upon which he must draw for all his needs, the material to which his labor must be applied for the supply of all his desires, for even the products of the sea cannot be taken, the light of the sun enjoyed, or any of the forces of nature utilized without the use of land or its products. On the land we are born, from it we live, to it we return again—children of the soil as true as is the blade of grass or the flower of the field. Take away from man all that belongs to land and he is but a disembodied spirit.[1]

Likewise, without labor, land is unable to satisfy human wants. Nothing is found in nature to which more or less labor must not be applied, ere it can be utilized. Labor is required to work up into useful form the matter provided by nature; in other words, the land or the products of the land. Even the ripe wild grape must be gathered before it can be eaten, and in similar manner we cannot conceive of anything that may be taken from the land without the application of some labor, even though it may be had for the mere taking, this in itself requires the labor of gathering it.

Although land and labor alone suffice for the production of wealth, to be deprived of the use of capital would reduce us to the level of the savage. Capital makes labor efficient and tremendously increases production. The phenomenal advance in the productivity of labor in the nineteenth century is chiefly attributable to the increased use of capital in the form of power-driven machinery. Therefore to preserve our civilization we must guard against the loss of capital.

Capital, Land and Labor Must Be Conserved.

Capital must be maintained by constant reproduction, since its tendency is rapidly to go to waste. But loss of capital need not be feared so long as we have land and labor from which to produce it anew. Nature is generous, but where foresight indicates a possible exhaustion of the raw materials she provides, laws to conserve these resources and to replenish those that can be replenished, should be and in some instances have been enacted.

Similarly, we now realize that labor must be conserved. The wealth of the entire world can be reproduced so long as we have labor—the mobile force—to apply to land and its products.[2] Experience has shown us that we cannot afford to permit abuses to exist which impair the power of labor of the working classes. For each individual incapacitated, the commonwealth not only suffers an economic loss measured by the reduction in capacity of the person affected, but a progressively increasing loss caused by the stunting of the working class from generations of abuse.

It is unwise to permit the employers to regard this matter as none of their concern, or to take the ground that the results are unfortunate but among the burdens the workers must bear, and few today are so short-sighted as to maintain this attitude. The majority see that impairment of the health of the working class is a distinct economic loss to the entire community, and believe that any tendency in that direc-

[1]From "Progress and Poverty," by Henry George.

[2]Destruction of wealth on a mammoth scale would cause no concern to a warring power, if it suffered no loss in manpower. In fact, if one adversary could eliminate loss of manpower while the other went on losing it at the same rate, the war could be concluded rapidly in a crushing defeat of the latter, assuming, of course, no shortage of raw materials in either case.

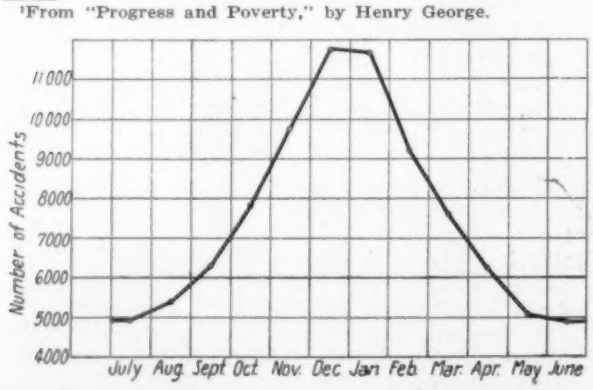


Fig. 1.—Showing the Seasonal Distribution of All Industrial Accidents for the Year.

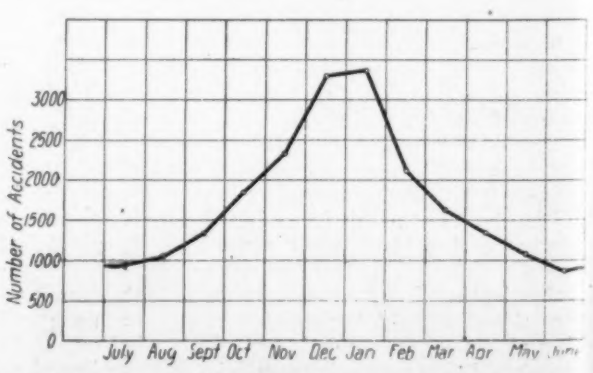


Fig. 2.—Showing Seasonal Distribution of All Industrial Accidents Caused by Inadequate Illumination.

tion should be checked and remedied by every reasonable means.

Therefore, in Wisconsin the State Government has established the Industrial Commission, which is vested with "the power of jurisdiction to have supervision of every employment, place of employment and public

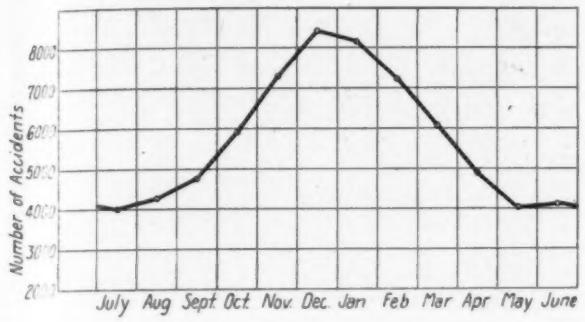


Fig 3.—Showing Seasonal Distribution of All Industrial Accidents Exclusive of Those Due to Inadequate Illumination.

building in this state as may be necessary adequately to enforce and administer all laws and lawful orders requiring such employment, place of employment or public building to be safe, and requiring the protection of the life, health, safety and welfare of every employee in such employment or place of employment and frequenter of such place of employment, and the safety of the public or tenants in any such public building.[3]

Realizing that the first requisite for safety and sanitation, but in particular safety, is good lighting the Commission early attacked the lighting problem. Orders covering lighting requirements in shops were issued in January, 1913, and much educational work was subsequently done in the state. These orders are now undergoing a revision. When the work was first begun, the avoidance of accident was the chief consideration. If because of poor lighting an employee steps into machinery or is otherwise injured, the

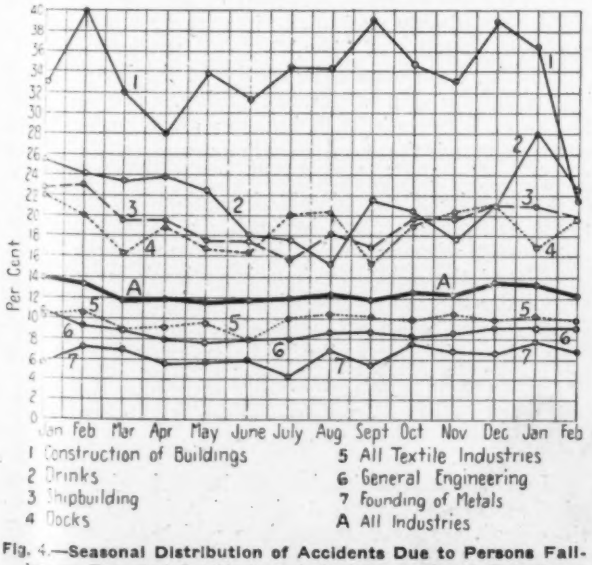

Per Cent
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec Jan Feb
1 Construction of Buildings
2 Drinks
3 Shipbuilding
4 Docks
5 All Textile Industries
6 General Engineering
7 Founding of Metals
A All Industries

Fig. 4.—Seasonal Distribution of Accidents Due to Persons Falling as Reported for Various Industries in Great Britain.

Commonwealth of Wisconsin has lost something by the reduction of that man's capacity. To reduce this hazard, it was found, required only a moderate intensity of illumination, and the orders issued were designed to remedy this condition.

There is another type of safety, however, which is of even greater importance, namely, *safety of the eyes* from strain caused by insufficient illumination, by a condition of glare, or by unavoidable shadows on the work. If a man through poor lighting impairs his eyesight, his productive power is cut down. Loss from this source is one that comes gradually. Impairment of vision is a gradual process and it may take months and even years before the individual becomes aware of it. However, during the time that impairment of vision is taking place, he is suffering discomfort and his productive power is lessening. Again society is the loser. To eliminate eye-strain requires further improvement in the lighting and the revised orders of the Commission will take this fact into consideration.

Illumination and Accidents.

When the causes of ordinary industrial accidents are given, mention is made of breaking hoists, cranes, winches and other machines; the bursting of grindstones and emery wheels; the improper use of circular saws, lathes and presses; contact with mill gearing

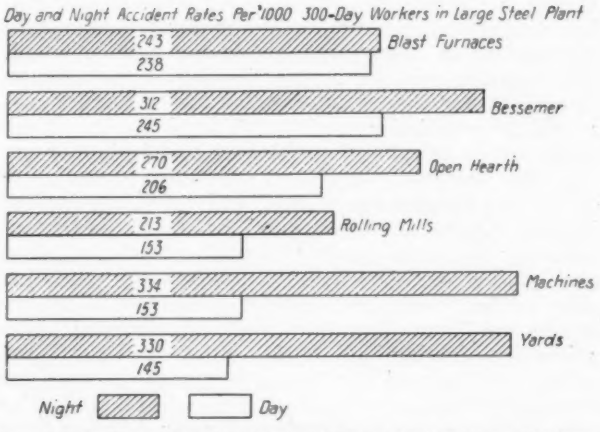


Fig. 5.—Day and Night Distribution of Accidents in Various Departments of a Large Steel Mill.

(shafts, pulleys and belts); and persons falling or being struck with falling material. Almost never in the reports to the Industrial Commission is a faulty lighting condition given as either the direct or indirect cause.[4]

Yet, it must be perfectly evident that inadequate and improper illumination increases the probability of accidents. In order that the workman may avoid a danger, he must be able to *"see it coming."* The statement has been made numerous times that of 500,000 avoidable accidents annually, 125,000 may be attributed directly or indirectly to poor lighting. While definite statistical proof of this statement is lacking, it is believed to be a conservative estimate. However, some very definite information presented by John Calder, in a paper before the American Society of Mechanical Engineers,[5] shows that the number of fatal accidents in the months of December and January is 40 per cent more than the normal number that might reasonably be expected if there were the same number of daylight hours in the winter as in the summer.

In a paper entitled "Illumination and One Year's

[3]Industrial Commission Law.

[4]An exception to the rule is a recent report of an accident where a man fell into an elevator pit. The cause given was "no light" near elevator.

[5]February, 1911.

Accidents,"[6] R. E. Simpson presents the results of a study of reports of every accident in and about factories, shops and mills carrying insurance with the Travelers' Insurance Company, covering the period from January 1 to December 31, 1910. After giving a few accounts of accidents caused by poor lighting, Mr. Simpson presents the following very illuminating data:

"Fig. 1 shows in a diagrammatic form the monthly distribution of all the industrial accidents reported for the year, and Fig. 2 shows a similar distribution of all the accidents caused by inadequate illumination. There is a striking similarity between these curves and those published by Mr. Calder and other investigators. From Fig. 2 the fact may be deducted that 51.6 per cent of the accidents due to poor illumination occurred in the months of November, December, January and February, while 48.4 per cent occurred in the remaining eight months. This indicates that the likelihood of an accident being caused by poor lighting is more than twice as great in any one of these four months as in any one of the remaining eight months.

"Fig. 3 shows the seasonal distribution of accidents exclusive of those in which the lighting conditions had an influence. It will be noted that the increase in the accident rate in the months of November, December, January and February is not so pronounced as in Figs. 1 and 2. If the lighting condition was the only factor contributing to the increase in accidents in the winter months, the curve in Fig. 3 would be practically straight. The similarity of the three curves raises the question as to whether or not a greater number of accidents than those shown were due to the lighting conditions. It is probable that the lack of information in some of the reports is responsible for a certain number of accidents attributed to the lighting conditions being overlooked, but just what this number would be is purely conjectural."

In the "First Report of the Departmental Committee on Lighting in Factories and Workshops," submitted to Reginald McKenna, Secretary of State for the Home Department, Great Britain, rather conclusive evidence is presented that poor lighting is a prolific cause of accidents. It is of interest to quote from this report:

"The connection between lighting and incidence of accidents has been investigated statistically, by means of a special return of all reported accidents for 1913 and part of 1914, in which the number of accidents occurring each month are given in Appendix IX., from which it appears that in respect of accidents due to 'persons falling' (a cause which would seem to be specially dependent on lighting conditions), the percentage to total accidents is higher during the period of the year when artificial lighting is used than in the summer months. Further, by the use of certain assumptions, it has been possible to calculate the probable accident rate per hour separately for artificial and natural lighting. The results indicate that for most industries the former is far higher than the latter, in some cases to the extent of about 40 per cent.

"Strictly speaking, these statistics only allow of a comparison between daylight and artificial light and not between good and bad lighting of the same kind, but inasmuch as natural lighting may be considered superior to artificial, so far at any rate as regards liability to accident, it may be inferred that the same relationship would hold between any methods of good and bad lighting.

[6]Volume X, No. 9, page 868, Transactions of the Illuminating Engineering Society.

Fig. 6.—Very Bad Lighting. Illumination Like This Makes Employment Unsafe to Life and Limb and Causes Excessive Eye-Strain.

"Further confirmation of the greater risk of accidents during night was given in the evidence of several witnesses. Thus, it was pointed out that the number of accidents occurring in shipbuilding yards at night is quite out of proportion to the small number of men employed. Instances of accidents due to bad lighting conditions were also given for foundries, iron and steel works, lace factories and cotton mills.

"In order to discover whether the connection between accident risk and lighting conditions is generally recognized, inquiry was made of the Accidents Offices Association, which embraces most of the insurance companies interested in workmen's compensation. In the reply of that association it was stated that:

"'(A) the rates of premium charged by its members are based upon the assumption that the lighting is normal; that if, upon survey, this is not found to be so, the insuring company would specify its requirements or deal with the case by rating;

"'(B) the effect of deficient or bad lighting upon a risk is distinctly prejudicial in varying degrees from the accident point of view.'"

In Fig. 4 are shown the results of the investigation into accidents due to persons falling. The accidents due to each cause in each industry are expressed as a percentage of the total accidents due to all causes occurring in that industry during the month in question. In spite of considerable irregularities, the curves are markedly concave, indicating a higher accident rate in the winter months than in the summer.

All of these independent investigations arrive at essentially the same conclusion, namely, that *accidents increase with diminution of illumination.* This confirms the opinion usually held that poor illumination of necessity increases the hazard of employment.

Kinds of Poor Illumination That Cause Accidents.

Insufficient illumination, perhaps, is the greatest of these causes. Men don't notice falling material; they don't see open places into which they may fall and more than one case of workmen being scalded to death in hot water or falling into pits has come to the writer's attention, where a little illumination might have prevented the fall. Stairways, passageways and yards are just the places which are apt to be poorly illuminated, and where irregularities in the surface are bound to cause falls. Taking into account the

length of time these places are in use and the comparatively few number of people who use them, the accident rate is astoundingly high compared with the rest of a plant. This is well illustrated by Fig. 5, which shows the day and night accident rates per 1000 of 300-day-per-year workers in a large steel plant.

Glare or great brightness contrasts in the field of vision is another cause of accidents. If a man works with an intense illumination at the work, from a local exposed lamp, so that he gets strong glare directly in his eyes, the upper portion of the shop is in semi-darkness and deep shadows are cast on the floor by the machines, similar to the conditions shown in Fig. 6, we have provided a situation which is bound to result in accident. The parts of the piece of work may have greatly different reflecting value, one portion being highly polished while the rest is of a dull gray color. The eye muscles are under a constant strain in the endeavor to adjust the pupils to rapidly changing light-reflecting conditions. Because of the intensity of the light, the pupils remain relatively small. Turning away from his machine the workman's eyes ere compelled to gaze into a dimly lighted field, and since the pupils of the eyes do not dilate as rapidly as they ordinarily contract, he suffers from a temporary semi-blindness which makes it impossible for him to see obstructions lying on the dimly lighted floor.

To eliminate such hazards, intense local lighting only should never be employed in a factory. A moderate degree of general lighting should always be supplied if local illumination is to be used at the machines, but whenever possible a system of general illumination only should be used, as this gives most satisfactory results. Bare lamps should never be used as local lights at the machines, because they tend to blind the workman and in most cases shine more strongly into the eyes of the man than on the work. A deep reflector which envelops the lamp so that no portion of the bright filament is visible should always be supplied. This will keep the light out of the eyes and will direct a stronger illumination upon the work, also permitting the use of a smaller size lamp and thus saving electrical energy.

Shadows may also cause accidents by concealing dangerous parts of machinery into which the workman may put his hands, or over which he may stumble. Local lights are apt to be the worst offenders from this viewpoint, but improperly applied overhead lighting will also be an offender. Uniformly distributed illumination and good diffusion are the only remedy and may be secured by means of a sufficient number of overhead light sources properly located with respect to the work.

Local lights are a nuisance and a cause of accidents from another source, namely the hazards that come from the use of lamp cord. The insulation is bound to wear and the cord remain in use until arcing between the wires, or ground on machines occur. Men are apt to wind the wire around parts of the body. Although usually the potential will not kill, it may cause a sudden movement which might bring the workman into contact with moving machinery.

(To be continued.)

Increased Electric Rate Based on Coal Cost Denied.

The Board of Public Utility Commissioners of New Jersey has handed down a ruling denying the application of the Bridgeton Electric Company and the Electric Company of New Jersey for permission to increase the charges for service, due to the advanced price of coal. The companies proposed a schedule based on the cost of coal in excess of $3.50 per ton delivered at the plants at Bridgeton, the average prevailing price prior to June, 1916, such to be 1 per cent of the amount for each 10 cents per ton advance, and reversely a deduction of 1 per cent for each 10 cents per ton of the cost of coal below the specified amount. The Board holds that the increase, as proposed by the companies, does not appear to be warranted from the figures submitted as to operating expenses, inasmuch as the desired rate would result in an increase of about 37½ per cent in the bills for electric light and power, based on the current price of coal, and, moreover, would not work equitably as between the different consumers, but would impose an unduly high charge upon those customers paying the higher base rates, tending as discriminatory practice against the small customer. In its decision the Board says:

"The additional cost of service due to increases in coal cost are not proportional to the rate charge, but are proportional to the fuel portion of the cost. The actual cost of fuel, measured in terms of kilowatt hours sold, has ranged with the Bridgeton company from about 1½ to 3 cents per kilowatt-hour."

Fig. 7.—Poor Arrangement, Insufficient Illumination, Dense, Shadows and Excessive Glare. It is to Eliminate Conditions Such as These That Lighting Legislation is Necessary.

Effect of the War on Street Lighting

Although Prices are the Highest in the History of the Industry and the Status of the Bond Market Is Not Favorable Toward Raising of Funds Indications Point to Usual Activity in this Field

By F. A. VAUGHN

Illuminating Engineer for City of Milwaukee.

HAS the present war yet affected the progress of street lighting in America? We all know of the tremendous influence which has been exerted on new and present street-lighting methods and contracts in European cities, especially in the air-raid infested sections, where all principles and methods of good street illumination have had to be practically abandoned—or shall we say, have been forced into the recognition of the authorities—and the systems turned into a means of sky darkening rather than of street lighting. The effect of the necessary shading of the lamps and dimming of bright spots on the streets, while acting as a safeguard from the menaces of the sky, is to accentuate and magnify the dangers on the streets, and an increase in accidents at night naturally results. As yet it has not become necessary to thus protect ourselves against the death-dealing enemy aviator, but there may be other influences reacting upon the development and operation of street lights in America.

Since the beginning of the war, prices and scarcity of materials in almost all lines have been increasing rapidly, and street-lighting materials have been no exception, especially such materials as steel poles, sheet and cast-metal parts and wires; in fact, materials used in this industry have rather been typical of the unprecedented rises in prices than any exception.

The present and future predominant scarcity and high prices of labor applies also to the new installations and the operation and upkeep of old ones.

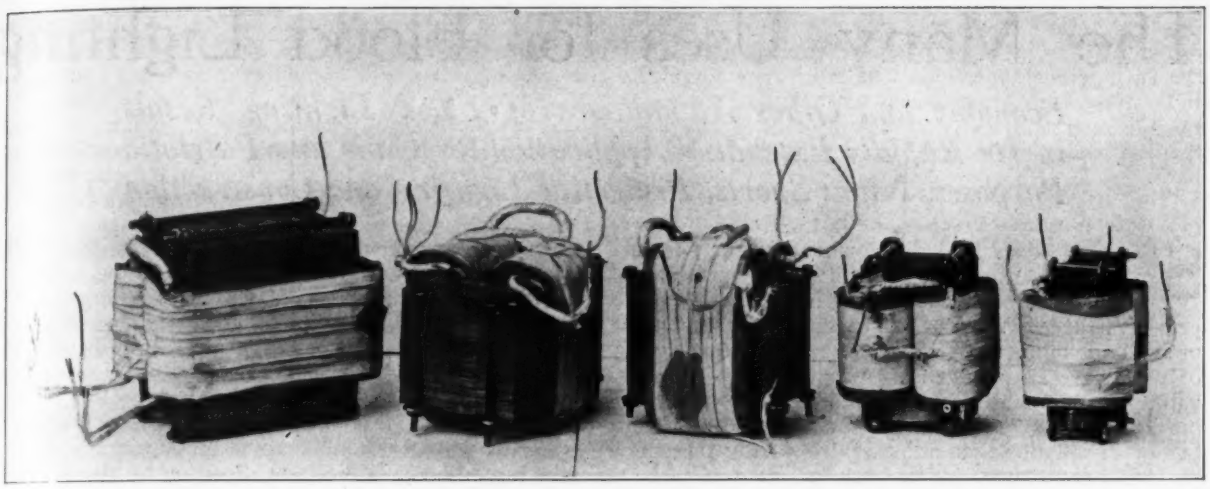
There is also a marked tendency on the part of public service organizations to demand an increase in energy rates on account of the effect of the above factors, and coal prices on the cost of producing energy. Whether commissions or city councils will grant these increases is, of course, indeterminate. Municipally owned plants may decide this matter as they please, but, of course, cannot escape any actual increase in cost of production.

Since the beginning of the war, the movement for greater number of daylight working hours has been instigated, and indirectly this will affect all "dusk to midnight" contracts, since midnight will actually occur by the clock one hour earlier with respect to sunset, and there will be proportionately less energy used and therefore shorter duration of the load on the station, on contracts of this kind. This, of course, does not affect all-night contracts, however.

Progress as Usual.

It is natural to assume that all this would have a marked effect upon decisions to make new installations or augment old ones. Nevertheless, the actual effect of these deterrents, at least in the Middle West, has, according to the writer's experience, scarcely been felt as yet. There are many street-lighting projects on foot in this section and with but one or two excep-

New Street-Lighting Installation Just Completed in Chicago.—Concrete Posts Support 100-Watt Lamp in Opal Globe.



Five Sizes of Lamp Transformers Used in Milwaukee's New Installation.

tions they are proceeding in spite of the outlook.

Of course, this may, perhaps, be explained by the fact that the realizations and rigors of war have hardly penetrated into the interior or to the recognition of the necessity of—in times of war and the depletion of police and fire and militia forces, and in the presence of spies and enemy agitators—providing for additional protection by night of the life and property of the nation. This is especially necessary in manufacturing centers, where large Government contracts are under way, and where the flood-lighting type of street and grounds illumination has received a tremendous impetus. The provision of the "preventive service" idea, inherent in the application of good street lighting to these increased requirements of war times, in place of the "remedial service" provided by the police, fire and military force, is an example of good judgment on the part of city officials who have an adequate appreciation of their responsibility for the safety of life and property of their citizens.

The future—at least, the immediate future—justifies but little hope that it will bring relief from the commercial deterrents of high prices and scarcities, but it may bring great necessities for increased protection by means of street lighting.

The policy of waiting for "prices to turn down" instead of for "something to turn up," especially if adhered to for any length of time, may soon find the municipalities with still more dilapidated and antiquated systems and more urgent requirements, both of which will some day in the near future react to require rather increased activities in reconstruction and rehabilitation of these systems.

Extensions in Milwaukee.

As an example of one municipality where the city authorities have not been unduly influenced by pessimistic effects of the war, Milwaukee may be cited, as they have decided unreservedly to proceed with the installation of their new street-lighting distribution system. In fact, in the case of the very complete system which is being constructed in the city of Milwaukee, very little obstruction has been encountered on account of the war as a direct cause.

As far as the increase of prices for raw material are concerned, Milwaukee is very fortunate to have already provided a complete supply of material which was purchased some time ago, when prices were much lower. Even since the declaration of war by this country, no hesitancy was exercised by the city council in providing municipal bonds to the extent of $750,000 for the completion of the new street-lighting distribution system, for which $750,000 had already been issued. There may be some delay in the actual sale of these bonds, due to the status of the bond market, which has been markedly affected directly and indirectly by the war, and the consequent governmental bond issues. However, the construction of this system is progressing and several hundred units are being erected at present.

The accompanying illustrations show the latest design of octagonal concrete post street lighting unit used in this installation, the complete line of series-multiple lamp transformer coils, and the method of setting the shortest type of concrete post.

Electrictiy Promotes Health on Board Ship.—In a report on marine hygiene, abstracted in the *Electrical Review*, of London, the assistant medical officer of health for Liverpool, England, insists upon the general introduction of lighting and ventilating by means of electricity, points that can now be dealt with by the standardization of construction. He mentions that on very large liners one method which has had good results, and allows of several changes of air per hour in the cabins, consists in using four large fans, 5 feet in diameter, driven by electric motors. These drive the fresh air from the upper deck into shafts suitably distributed. The air is sufficiently heated on entering by means of steam coils, to allow the temperature of 60 degrees Fahrenheit to be maintained in the terminal distributing shafts. He suggests that the exhaust fans for extracting the vitiated air from the cabins should be of smaller capacity than the blowing fans, to enable a slight internal pressure to be maintained. It is, he says, very desirable that the lighting of living quarters should be more carefully arranged.

Utility Company Is Required to Supply Power.—The Public Utilities Commission of Washington has notified the Spokane & Inland Empire Railway Company that it must continue to furnish power to pumping plants of the Hayden Lake Irrigation Company for irrigation purposes. The contract between the two expired July 1. Another contract was made with the Washington Water Power Company, which could not deliver the power. Then the railway company refused to furnish the power.

The Many Uses for Flood Lighting

Economy and Other Advantages of Flood Lighting Result in Its Rapidly Extending Application for Civic and Patriotic Purposes, Night Sports, Protective Lighting and Construction

SELDOM does the development of a new art make such rapid progress as has been witnessed in the case of flood lighting in a little over two years. Scarcely heard of before 1915, this new method of lighting has found a very great variety of uses, several of which are proving of most timely value for national defense. They range from the purely utilitarian to the highly artistic and the number of installations put into service during these few years is almost countless.

Development of Flood Lighting and of Projectors.

The idea of flood lighting had been suggested many years ago, and in a few instances actually carried out by using special arc-lamp equipment. A notable case of this kind was the illumination of several baseball parks, with the idea of promoting night playing; the installations at Comiskey Park, in Chicago, was described in the Electrical Review and Western Electrician in September 3, 1910. Another case was the flood lighting of Niagara Falls, at about this time, by means of several batteries of arc searchlights. Numerous difficulties attended this method of arc flood lighting, however, the chief of which were high cost of installation, operation and upkeep, and unsteadiness of the light, if the operators of the lamps did not pay close attention to proper feeding. Consequently little progress in this direction resulted.

Following the advent of the gas-filled tungsten lamp with its concentrated filament, the prediction was made that it would be used extensively for projection purposes, especially stereopticon and motion-picture projection. In this latter particular the prediction was not actually fulfilled until quite recently, but it was borne out in a different direction by the development of a practically new type of projecting equipment. The new lamps came into use in automobile headlights, where it was observed that they very greatly increased the power and effective illuminating distance of these lamps. It was but natural to use the lamps in enlarged and otherwise modified headlights, now known as projectors, designed especially for projecting the light over large areas and to distances of several hundred feet.

Since 1915 several different makes and types of projectors have been developed. They are all based on the geometrical principles of the parabola, which is a curve of such shape that the rays from a point source of light at its focus will be reflected from its surface in lines absolutely parallel to the axis. Of course, the concentrated-filament tungsten lamp is by

Night View of the Flood-Lighted Capitol at Washington, D. C., as Seen from Pennsylvania Avenue.

no means a point source and a true parabolic surface would be expensive to produce. Moreover, projection of actually parallel rays, with little or no divergence, while desirable in searchlight illumination at very great distances, is not desired in flood lighting. An angle of about 6 to nearly 30 degrees is actually needed to spread the light over a fairly large area and to produce a uniform illumination of the entire area, without intermediate dark spots, where several projectors are used.

Flood-light projectors, as now developed, fall into two principal classes. The first comprises those that have reflectors of almost perfect parabolic shape. These have a very high efficiency for intense lighting of a rather restricted zone; for instance, the illumination of a statue, where the light should be restricted to the sculptured figure. These projectors operate best with special flood-light or focusing lamps with exceptionally concentrated filaments. If desired, these projectors can have their beams widened somewhat by moving the lamp out of focus, but this soon introduces a dark spot in the center of the illuminated area. The second class consists of those projectors whose reflectors are slight departures from the true parabola. They have a larger illuminated field and are more useful for general purposes, though slightly less efficient if concentration of light is desired. In many cases these are employed with standard lamps of the gas-filled tungsten type.

While flood lighting as a rule involves the use of what are commonly known as projectors, this is not absolutely essential. Several successful installations have been made that employ special types of angle reflectors. These are specially suited for places where the projecting equipment must be mounted very near to the surface illuminated, as for instance a building front, lighted from units placed at the edge of the sidewalk, only 10 to possibly 15 feet away. Nearly all flood-lighting equipment makes use of either standard or special gas-filled tungsten lamps of 250, 500, or 1000-watt sizes.

Flood Lighting of Buildings.

Early attempts at the exterior lighting of buildings were confined almost entirely to what was known as outlining, which meant the placing of long rows of small incandescent lamps at the cornice line and along other prominent lines of the building front, in some cases every window being so outlined. While novel effects were obtainable by these means, as a rule the lighting was far from being satisfactory. It involved a large installation cost for wiring and for many lamps, and at best the building was not effectively illuminated. When the projector had been developed, means were at hand for throwing light over the entire surface of the building from a distance, literally flooding the facade with light and from this arose the term "flood lighting." This method of illuminating a building exterior not only showed up the entire building front, but in many cases, on account of the changes in lights and shadows that could be effected, actually enhanced the architectural beauty of the structure. It enabled the architect to have his product viewed in its full splendor by night, as well as by day, and in certain instances even added an additional charm to the view thus obtained by night. The lighting was done quite economically from a relatively small number of projector units that could be installed at comparatively small expense. One of the first and unquestionably the finest early example of flood lighting of buildings was at the Panama-Pacific International Exposition at San Franciso during 1915. In this case arc lamps were used to a considerable extent, as well as arc searchlights and incandescent projectors. This fine example showed what could be done with this new method of lighting and other installations followed quite rapidly.

Flood Lighting for Civic and Patriotic Purposes

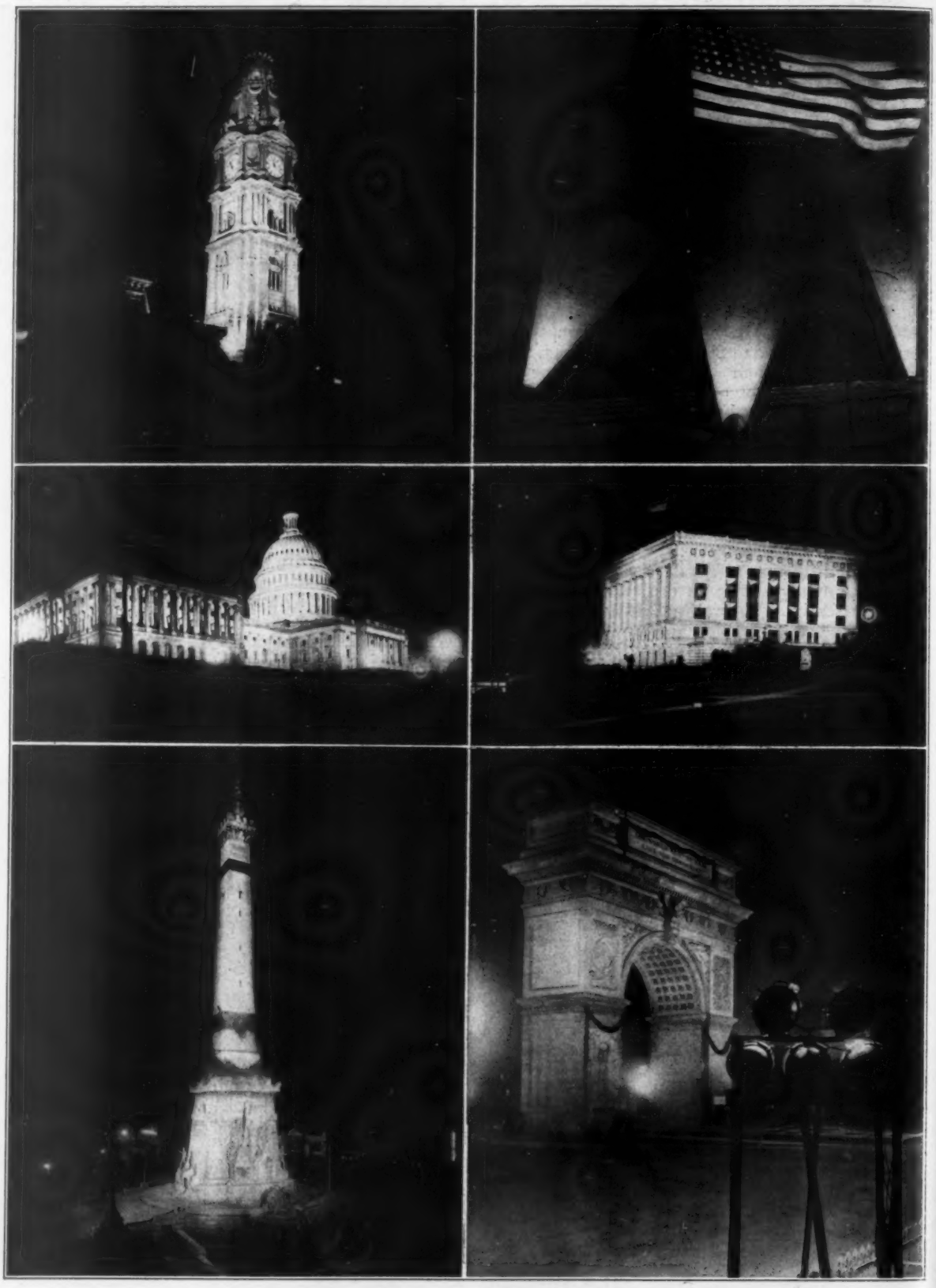
While in the foregoing it was pointed out that flood lighting of buildings has important architectural and artistic uses, combined with these, in many cases, are valuable civic and patriotic functions. This is especially true in the case of public buildings. Civic pride prompts many a community to have its principal administrative building made prominent to visitors at night as well as by day. An attractive flood lighting of such a structure also has a valuable influence on the citizens. The value of flood lighting in this sense is enhanced with the importance of the structure. The capitol of a state, for instance, is a building that the citizens from all parts of the commonwealth should take keen interest in and if they happen to visit the capital city at night, they should be able to see it conspicuously. Still more is this true in the case of the capitol of the nation, and the splendid illumination of this structure, recently completed so successfully, is an excellent example of flood lighting for patriotic purposes.

Similar aims are obtained by flood lighting of monuments and statues, especially where these commemorate national heroes. Here again the object is twofold, being both artistic and patriotic. Almost every progressive city now boasts of some of its prominent monuments being illuminated at night for the stimulating influence this has upon the loyalty of its citizens. Among the very large number of fine examples of monument and statue lighting may be cited the illumination of Bartholdi's famous Statue of Liberty in New York Harbor, and the stately Soldiers' and Sailors' Monument in Indianapolis; a view of the latter is shown herewith.

Flood Lighting for Night Sports.

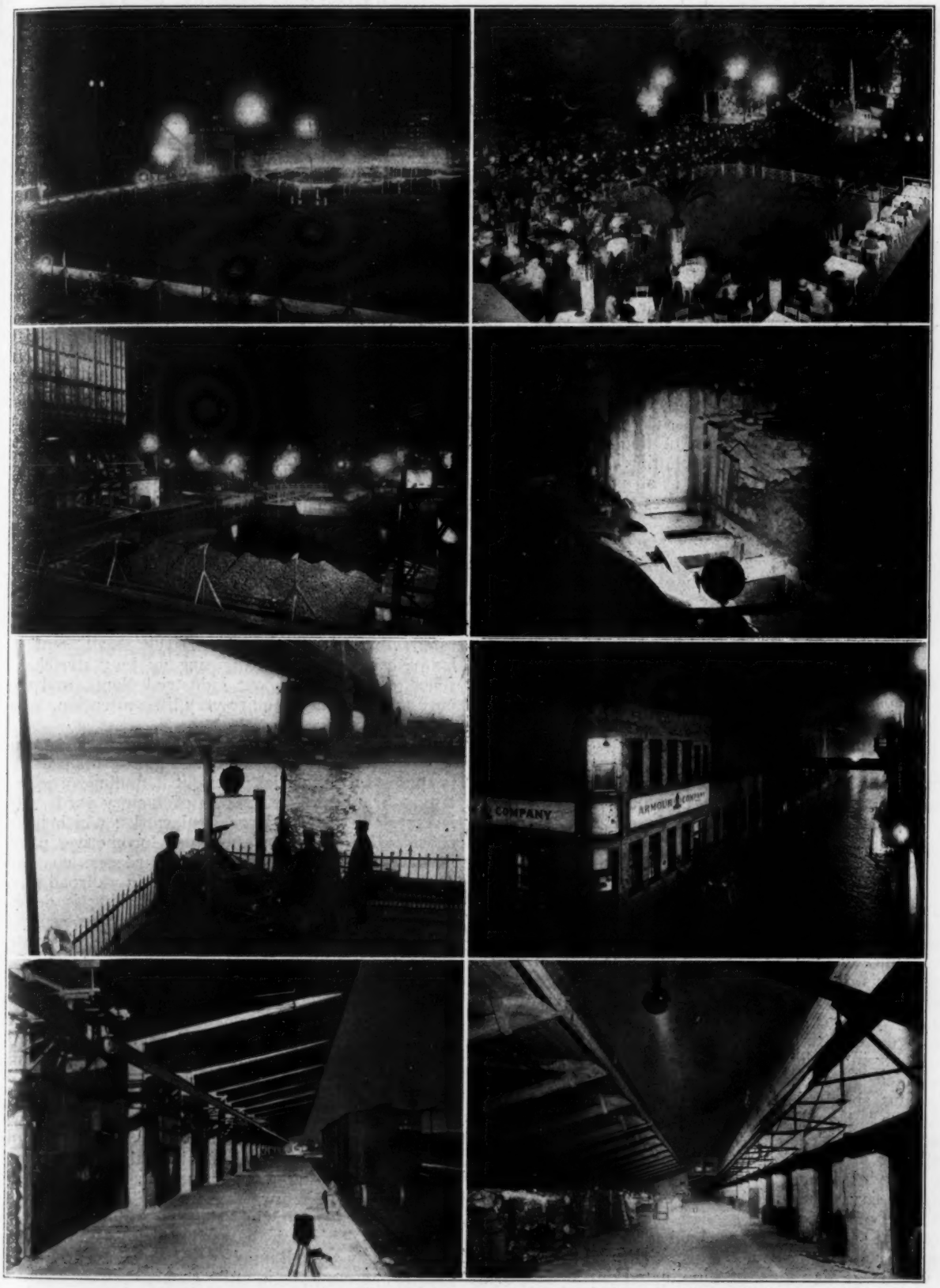
The possibility of promoting outdoor sports at night by means of illumination available through flood-light projectors was early foreseen, and one of its first applications was for lighting gridirons of college football teams, who in order to utilize the limited spare time available for intensive practice, seized upon the possibility of playing at night. When the field was illuminated by arc or other ordinary lamps, insufficient illumination was obtained as a rule. By mounting flood-light projectors at considerable elevations on each side of the field and from at least two directions, a very much more satisfactory illumination was obtained. Another early application was for the illumination of trap-shooting grounds. This requires a small number of lamps placed behind the marksmen. Some experts claim that the brilliant illumination of the clay birds against the dark background of the sky is even more effective than daylight. Target practice and range shooting are now also made possible by night with the aid of flood lighting.

Another application in this line is the illumination of bathing beaches, which has been carried out quite successfully in numerous cases. In this instance there is involved a considerable area of water, as well as the beach, and the lighting can be effected by using either a large number of closely focused projectors, or a smaller number of larger wide-angle projectors.



Typical Installations of Flood Lighting for Civic and Patriotic Purposes.

Flood lighting can be employed very effectively to promote civic and patriotic ends, as shown by the above typical illustrations. These, in order, are as follows: Tower of City Hall, Philadelphia, Pa. Flood lighting a flag on a building roof by means of three projectors. The Capitol, Washington, D. C., from the Senate end. County Court House, Duluth, Minn. Soldiers' and Sailors' Monument, Indianapolis, Ind. Washington Arch, New York City, and one of the groups of projectors for lighting it.



Typical Cases of Flood Lighting for Festival, Commercial, Industrial and Protective Purposes.

Flood lighting adapts itself to various utilitarian as well as artistic purposes. A few of these are shown above. In order, these are as follows: Festival on New Haven Green. Concert garden in Chicago. Important coal docks. Foundation pit under construction lighted by single projector. Projector arranged for protective lighting of bridge piers. Protective lighting for street in packing town. Protective lighting of loading platform of Galveston cotton press. Protective lighting of a roadway in large cotton press.

Safety is the prime requirement and can be easily insured by a proper positioning of the projectors. One of the most successful installations in this line is the illumination of Clarendon Municipal Beach in Chicago, which is lighted by means of 20 projectors, mounted on two structural-steel towers, 85 feet high. High mounting is especially desirable because it minimizes the glare when bathers are swimming back to the beach. An excessive amount of glare, due to low mounting of lamps, may prove not only annoying but in some cases even hazardous. Playgrounds have also been effectively illuminated by means of flood lamps, a comparatively small number of which will light a large area. In some instances, where these grounds adjoined a school building, the flood lamps were placed on top of the building, about 60 feet above the ground.

Skating is another case of a splendid outdoor sport which can be indulged in to only a limited extent by most people that are employed during the day if no effective provision is made for lighting the skating pond. To do this by means of arc or other ordinary lamps was more or less successful, but when a large number of skaters are congregated on a relatively small pond, a more intense illumination is necessary. This can be provided by the means of flood lights. In all cases of flood lighting high mounting is desirable and should be provided for if it is at all possible because, as already referred to, this reduces the blinding glare when the lamps are mounted low.

In the same category may be placed the lighting of special night festivals and pageants. Formerly these involved the use of a multitude of small lamps, which, while adding a certain gayety to the celebration, necessitated a heavy outlay for wiring and installation, this usually being of a temporary character. By use of flood-lighting projectors a pageant or festival arena can be easily lighted from a relatively small number of lamps.

Advertising Value of Flood Lighting.

The advertising value of flood lighting was quickly seized upon and numerous billboards, which had never been lighted, whose illumination had formerly been very poor, were equipped with flood-light projectors. Especially was this the case where the billboards were placed at some distance from the roadway, or on some conspicuous hill; likewise was this true in the case of prominent roof signs, where it was evident that a large sign could be illuminated by means of few flood lamps and therefore could be done much more economically than by ordinary methods of sign lighting. This does not mean that the older methods have been superseded, nor that flood lighting is adaptable to all types of signs. It is employed best in large painted signs, where it is necessary to use the utmost economy in the lighting. A case of this kind is in the so-called slogan signs, adopted by many cities, where lighting should be provided at the lowest possible expense. Many bulletin boards and billboards have been lighted for a long time by means of an angle reflector placed in front of their upper edges. This is a modified form of flood lighting, which in some cases is further modified by adding additional reflectors in front of the face of the sign, these being suspended from the same hangers that hold angle reflectors at the top. Such installations are especially valuable where a very large sign must be illuminated on the side of a building and no possibility exists for placing projectors on the opposite side of the street. The advertising value of lighting commercial buildings has already been referred to.

Flood Lighting for Construction Work.

Construction work on large projects is usually long drawn out, unless provision can be made for carrying it on by night shifts, as well as by day. A variety of lighting equipment has been used for this purpose, ranging from special gasoline torches to arc lamps and clusters of incandescent lamps. Where a large number of lamps of the older types were employed trouble was frequently encountered, due to the circuit wires for these lamps coming in the way of derricks, concrete spouts, hoists, etc. Consequently, when the flood lamp was developed one of its early applications was for illuminating construction work, especially work on foundations. In working in a pit good light is necessary, both for safety and for carrying on the work efficiently. If the pit is in the nature of a trench for the foundation of a wall, in many cases a single flood lamp will illuminate it properly, if it is placed so that the glare from the lamp is not annoying to the workman. For lighting up a large foundation several flood lamps may be required, and these may be placed at the edges of the work so as to avoid the inferences referred to.

Protective Lighting.

As soon as our country became involved in war incendiary fires, explosions and other acts of malice occurred, especially in such industrial establishments as were turning out munitions of war. It was long ago stated that an arc lamp is the equivalent of a policeman. This idea is the basis for protective lighting, although modern methods seldom make use of the arc lamp. Flood lighting by means of modern projectors with gas-filled tungsten lamps is of course much more satisfactory because a comparatively small number of lamps can be used for lighting up long stretches of fence, or inclosure about industrial plants, and when once installed they require very little attention.

Industrial Uses of Flood Lighting.

Aside from the uses of flood lighting for protective purposes for industrial plants, it is finding an increasing application in the lighting of factory yards. This is especially true in large steel works, which have a considerable number of switching locomotives passing back and forth between blast furnaces, converter, open-hearth and other buildings. In railroad yards, where a great deal of freight switching is done at night flood lighting is proving very effective, especially where the flood lamps are mounted high, so as to cause as little glare as possible and so as to minimize interference with colored signal lamps. In the lighting of canal locks, docks, wharves and similar places, flood lighting is proving very effective, because of the small number of lamps required. It is being used with good results for natural ice harvesting on lakes and ponds in the northern part of the country.

In conclusion, it may be well to briefly summarize the advantages of flood lighting in comparison with older methods of illumination. These may be grouped chiefly in four divisions, of which the first is that it permits the lighting of many areas that are inaccessible for illumination in any other way. Second, it provides a powerful source of light that is easily controlled and operated. Third, it is easily installed and wired, because only a small number of lamps have to be taken care of. Fourth, it is quite economical, as compared with the use of a large number of small lamps. With these very important advantages it would not be surprising to find still greater use for flood lighting and application to many new purposes.

Business Conditions in the Industry

A Summary of Views Obtained By a Personal Visit to Important Trade Centers and Expressions from Prominent Manufacturers and Jobbers Respecting Present Conditions and the Outlook for the Future

By C. W. FORBRICH

Special Representative, International Trade Press, Inc.

"BUSINESS is good; in fact, the best it has been in years, but what will conditions be tomorrow or next month or next year?" This, in brief, summarizes the attitude of the American business man.

Never before in the history of the country has there been such genuine, universal prosperity and never has there been such an undercurrent of questioning as to what the future holds forth. There are some who look with misgivings on the outlook for the future, believing that a decided slump is inevitable, others who would disdain from hazarding even a guess as to what will transpire, and a great many who firmly believe that there will be perhaps a readjustment of business conditions but that it will be coincident with permanent prosperity. This optimism is based first on reports that crops will not only be of immense proportions, but that farmers will obtain unprecedented prices. As one authority expressed it, because of these conditions the farmer will have more money than ever before. While the farmer is practically a negligible factor in the consumption of electrical goods, his prosperity will almost immediately extend to the country merchants, and thence through the small towns to the retailers and jobbers of larger cities. When this process has proceeded sufficiently far, there will be a great stimulation of such building and other operations that call for electrical apparatus and supplies.

C. W. Forbrich.

Another reason for the belief in the continued prosperity is the confidence of America business in the Government and in the final outcome of the present war.

For the purpose of obtaining first-hand information relative to business conditions—present and future—the writer, during the past few weeks, visited all the principal cities, and called upon many of the leading electrical men within a radius of 500 miles of Chicago.

Most electrical men, while still studying the conditions which brought about the present unparalleled prosperity seem more interested in determining how long the demand will last and how soon the present manufacturing and other vexatious questions will adjust themselves.

Obviously the present wave of prosperity is the direct result of the world conflict, the manufacturer being the first to be benefited, the jobber and dealer following. The great demand of the allies, the industrial mobilization and more recently our own preparations for war resulted in a demand for electrical machinery and equipment unprecedented in the history of the industry.

The demand in many lines has been so great that the writer knows of instances where men have stayed away from their offices to avoid personal appeals for assistance in getting orders filled.

It has not been a question of obtaining orders; the burning question has been, "How can we manage to fill the orders?"

At present the chief problem of the manufacturer seems to be the securing of labor. Most firms seem to have successfully solved the problem of obtaining sufficient material required in the production of their wares, although some minor commodities are still hard to obtain. Manufacturers have made herculean efforts to keep pace with the demand. Plants have been enlarged to the utmost, "speed" has been the watchword, and high wages have been the incentive to the workmen to meet the demand of the consumer. That most plants have reached the extreme limit in production seems certain.

In normal prosperous times it has been the experience of many firms to receive a large number of small orders, whereas during the present abnormal wave of prosperity the order seems to have been reversed and orders have been fewer but abnormal in size.

Two questions seem uppermost in the minds of the wide-awake electrical man, namely, how will the contemplated Governmental regulation of prices affect the industry, and, what effect will the anticipated slackening up of orders have?

Many of the men interviewed seem to be of the opinion that the anticipated Government price regulation will help business rather than hinder it, and as an example, the cost of bare copper wire is cited. It is a well known fact that many transmission projects have been deferred partly on account of the high cost of wire and as soon as this commodity can be purchased at a more nearly normal price it is expected that transmission construction work will receive a great impetus.

It has been stated that in the past month or two considerable rehabilitation of telephone, telegraph and electric light lines has been suspended, probably on account of the contemplated lowering of prices on many commodities.

Relative to the anticipated slackening up of orders, the opinion seems to prevail that this condition will not exist until peace is declared, and probably not for some time thereafter. This country is basically a farmers' country and good crops mean good business generally.

Unless the unexpected happens, the year 1917 will produce a bumper crop, with money plentiful, high

prices for all farm products and high wages.

Unfortunately, several branches of the industry have not shared in the general prosperity, as for instance, several lines dependent mainly upon the building industry. With the approach of normal conditions and the lowering of prices, it is confidently expected that the lost ground will be more than made up.

The American nation and the American business man have the utmost confidence in the stability of the Government. Willingly and generously is the electrical industry contributing to bring to a successful conclusion the great conflict into which we were finally forced. Victory will be achieved sooner if every electrical man does his bit to keep business good and instill in his fellowmen that confidence which is so essential to success.

In the following paragraphs are given in condensed form the views of a number of prominent manufacturers and electrical supply jobbers regarding the present situation and the outlook for the future.

Conditions Among Manufacturers.

J. H. McGill, McGill Manufacturing Company, Valparaiso, Ind.—It is very difficult to forecast future conditions when present conditions are abnormal. Rapidly changing economic and political forces make it almost impossible to hazard a guess as to conditions in the electrical industry, even in the near future. I believe that prices on basic materials have reached their highest point, and if economic causes do not check the advance in prices that Governmental regulations will be necessary.

L. L. Brastow, Trumbull Electric Manufacturing Company, Plainville, Conn.—Business conditions with us at this time are most satisfactory. There seems to be very little let up. In some lines which are used perhaps more in manufacturing construction, the business is larger than ever. On some of the smaller wiring devices used in home building there is some let up. It seems to us, in a general way, that business in the next year is going to be very prosperous. Construction is going on very largely in manufacturing work, which will require a large amount of certain classes of electrical material. We believe that, on account of the shortage of labor and other conditions which are perfectly familiar to everyone, that there will be more or less let up in house building which will have an effect on some of our lines, although this very likely to a large extent will be equalized by additional building for Government and factory necessities. The great thing for all manufacturers and business men in general to guard against is waste. A necessity also at this time is increased production.

A. W. Berresford, general manager, Cutler-Hammer Manufacturing Company, Milwaukee, Wis.—So far as present conditions are concerned, the self generated demand for the Cutler-Hammer Company's product is taxing its present capacity. We are making no effort to expand business, and, as a matter of fact, would consider it more or less unpatriotic to make such effort. We are trying to decide conscientiously the day to day questions which are put before us by the conditions, and to carry on our operations with more regard to the general interest than to our own. I say this to indicate that the fundamental conditions of doing business are radically changed, and that the new elements included so radically change the normal relation that the statements ordinarily of interest are without value. So far as my own information goes, the electrical industry as a whole is exceedingly busy and profitably busy. That it will continue so, whether on work directly in its line or other which it must take up for the public good, is inevitable. As to how profitably busy it will be is uncertain. I refer, of course, to the net profits available for dividends.

Truman Hibbard, Electric Machinery Company, Minneapolis, Minn.—Our opinion as to the future of the business in which we are engaged is most optimistic. We expect when the war ends there will be a readjustment in all lines of business as well as ours, but we believe that this readjustment will not be more serious in the electrical manufacturing field than in any others.

C. E. Corrigan, National Metal Molding Company, Pittsburgh, Pa.—The chief difficulty which we have to contend with is inability to obtain deliveries of raw material for manufacture of our products in certain lines. This is most notably true of rigid conduit, because our source of supply for raw pipe has every manufacturing capacity fully occupied furnishing materials for Government requirements. This condition very likely will continue for some months to come, and presume

Summary of Opinions of Prominent Manufacturers.

A. D. Childs,
Sales Manager, Cooper Hewitt Electric Company.

"In spite of the usual ordinary moderate demand for lighting equipment during the summer months, we have only been able to keep up with our requirements, and now apparently will have to work nights and Sundays to keep anywhere near the demand."

A. W. Berresford,
General Manager, Cutler-Hammer Manufacturing Company.

"The electrical industry as a whole is exceedingly busy and profitably busy. That it will continue so, whether on work directly in its line, or other work which it must take up for the public good is inevitable. As to how profitably busy it will be is uncertain. I refer, of course, to the net profits available for dividends."

Truman Hibbard,
Vice-President, Electric Machinery Company.

"Our opinion as to the future of the business in which we are engaged is most optimistic. We expect when the war ends there will be a readjustment in all lines of business as well as ours but we believe that this readjustment will not be more serious in the electrical manufacturing field than in any others."

J. H. McGill,
President, McGill Manufacturing Company.

"It is very difficult to forecast future conditions when present conditions are abnormal. I believe that prices on basic materials have reached their highest point, and if economic causes do not check the advance in prices that governmental regulations will be necessary."

L. L. Brastow,
Sales Manager, Trumbull Electric Manufacturing Company.

"Business during the next year is going to be very prosperous. Construction is going on very largely in manufacturing work, which will require a large amount of certain classes of electrical material."

C. E. Corrigan,
Vice-President, National Metal Molding Company.

"Business has slowed up somewhat during the last 40 or 50 days awaiting the determination by the government of the rumored plan of price fixing in the steel and other industries. Underlying business conditions are in excellent shape and when the government has finally determined the problem of price fixing and the trade in general know what they have to meet in this regard, it would be logical to assume that it would cause a revival in all business."

that Government requirements on manufacturers of iron and steel products will prevent manufacturers from supplying consumers promptly until such time as the manufacturers of iron and steel have met by deliveries the Government requirements—a condition which all loyal and patriotic individuals and companies recognize as the first desirable and necessary condition to fulfill, and patiently and loyally wait until same is satisfied. The business has slowed up during the last 40 or 50 days awaiting the determination by the Government of the rumored plan of price fixing in the steel and other industries. Underlying business conditions are in excellent shape and when the Government has finally determined the problem of price fixing and the trade in general know what they have to meet in this regard, it would be logical to assume that it would cause a revival of very great activities in all business channels. The immediate effect of the Government's rumored attitude in reference to price fixing in the steel industry has been to harden prices, which must ultimately be beneficial to trade in general. It is difficult, with any degree of certainty, to accurately forecast business conditions for the balance of this and the first of next year, but all conditions would indicate a revival of very great activity in all lines when the question of Government price fixing is settled; also the final passage and enactment of the Government income tax law.

C. P. Lashelle, W. R. Ostrander & Company, New York.—Our volume of business for the first eight months of 1917 was fully up to our anticipations. Our analysis of present conditions demonstrates a decided tendency on the part of buyers to restrict purchases to manufacturers, thus developing a condition which, in our opinion as manufacturers, is ideal, for it does not impose artificial competition. It is our opinion that the present market is stable and will remain so for the immediate future, without marked fluctuation in either direction. It is a market which permits the stocking of standard supplies, in which respect it more closely resembles a normal market than any year since 1914.

F. L. Vanderpoel, Trumbull-Vanderpoel Electric Manufacturing Company, Bantam, Conn.—Manufacturing and selling conditions during the past 12 months have been unique, not only in the history of the electrical development but in all branches of manufacturing, and we believe that it will be at least a year before conditions change for the better, and in the meantime, we expect to see the raw material market even worse than it is at the present time. It is the opinion of the writer that even should the war stop this Fall, which is exceedingly unlikely, that owing to the depleted conditions of the countries abroad, that the demand for raw material will be as great, if not greater, than it is at the present time. In regard to the possible outlook for future business, we consider that there will be more business a year from now than there is at the present time. The only trouble will be in procuring labor and raw material.

W. S. Clark, Jas. Clark, Jr., Electric Company, Louisville, Ky.—Present conditions are so unsettled, that the writer would hesitate about prognosticating at this time. We might add that our manufacturing department has been over-run with orders, and it has just gotten to a point where we are not able to accept orders at this time. In our manufacturing department, we not only do business in this country, but do business for export all over the world. In our supply department business has been quiet.

A. L. Wilkinson, Ohio Brass Company, Mansfield, O.—We hesitate to make a statement in times and under conditions like the present, which will have in it any semblance of prophecy on our part because someone with confidence in us and yet without full knowledge of what may be actuating our statement, may be, to a greater or less degree, guided by our written opinion (just as may be true of a hundred other concerns' views) and may be misled. We are humanly fallible in our judgments based upon the information before us which we actually see, and perhaps our grasp of all the conditions may not be complete, and beyond that, the conditions themselves may change very materially before this appears in print. Perhaps the best indication of our present attitude is that we are building rather largely at our Mansfield, Ohio, plant and also at our Barberton, Ohio, pottery, and that we have within the past two months, by unusual exertions, received the greatest quantity of raw materials that has ever come into our plants within the same given length

Summary of Opinions of Prominent Supply Jobbers.

George A. McKinlock,
President, Central Electric Company, Chicago.

"The present conditions in the electrical supply business indicate unusual activity. The great bulk of the increase in business may be traced indirectly to the preparation and organization of the industries, transportation companies, supplies of natural products, etc., to maintain and support a vigorous prosecution of the war. The future outlook is largely colored by these matters."

W. R. Herstein,
Secretary, Electric Supply Company, Memphis.

"Crops throughout the South generally promise to be unusually heavy, and this fact coupled with the unprecedented prices now commanded by farm products, will place in the hands of the farming community, a larger volume of money than they have ever had before. The farmer's prosperity will immediately extend to the country merchants and thence through the small towns to the retailers and jobbers. When this process has proceeded sufficiently there will be a stimulation of building and other operations that call for electrical material."

W. W. Low,
President, Electric Appliance Company, Chicago.

"There will be more trouble to get material than to get orders. While it is true that material is very high and central stations cannot afford to make any big extensions, the demand from the industrial field will more than make up for the loss in this field."

F. M. Bernardin,
President B-R Electric Company, Kansas City.

"Increasing big business, but on more of a war basis, is looked forward to in every section of the Southwest where adjustment to war conditions has already been met by the farmers, elevators and flour mills. Other industries in the Southwest will adjust themselves to war conditions as quickly as the mills and elevators. All stand ready to 'do their damnedest during the war. Industry is copying the farmer and putting forth every effort to increase production, knowing full well that the out-

C. D. Williams,
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of time, and are proceeding upon the basis of continuing until there is a notable change of conditions, to secure such raw materials. These are in many cases in excess of the orders which we now have (and I mention this merely to indicate that we are at least planning for a large future business) although constantly, also, we are endeavoring to get great quantities of materials to apply to orders which we do have. Further, aside from the additional buildings mentioned and the quantities of raw materials incoming, new facilities for increased production are constantly being added. As to the volume of business, which is tremendously greater than at any previous period, we presume our condition is no different, unless possibly in slight degree, from that of most other reputable concerns. The labor situation is so well known that it seems useless to comment upon it. We rather feel that we have been favored to a degree, though whether by chance or by the treatment afforded employees is a question. Probably both. Profits are not in proportion to prices and the volume of business because, as is well known to all manufacturers, the finished product is for the most part sold by us upon a basis of the raw material and labor price in vogue at the time of sale, whereas both rapidly increase prior to the time of manufacture and shipment. The expenses incident to securing materials and men are, of course, unprecedented. The tax situation is going to have its bearing. In connection with this, we, as no doubt is the case with many others, shall be most glad to do our part. A little previous experience with peace talk indicates that the world issues are so tremendous that ordinary human beings cannot estimate its value from either a peace or a humanitarian standpoint. Therefore, we are guessing when we buy beyond our known requirements or build beyond our known requirements. In our belief, there are classes of business which will improve at least for a period of time following the conclusion of the war. What will happen to the electrical field, both in this country and abroad, immediately following peace agreement is a difficult question to answer. Undoubtedly European countries and some which are directly tributary to them will require many things, part of which will be purchased from this country. As to the development in our own country immediately following the war, we imagine there will be a period of hesitation, and perhaps during that time prices may reduce materially, and as a consequence we as manufacturers will lose largely upon the raw materials which we are constantly getting in and for which we have contracted, and the labor and other expenditures created in producing the finished stock, all of which will have been done at the highest cost known in this industry. Naturally there is some lag in the sale of bonds for commercial purposes at the present time, which should have its influence in slowing up to a degree the present rapid development, but thus far there is no perceptible difference in the tremendous (relatively) volume of incoming orders. Getting a little further beyond the conclusion of peace (which we take enough of your space to express the hope will be the right kind of a peace for the world's future) we imagine there will be considerable fluctuation, for a period of time, in the volume of different classes of business, and that within from three to five years after the conclusion of the war there may be quite generally a depression. However, as the present world conditions have never been duplicated, any individual man or company's views may well prove wrong. Never has there been such intimate association amongst the countries of the world; never so many things required to maintain the present standard of business in individual countries and in inter-communicating countries; never such facilities for rapid communication of all sorts around the globe, and never such interchange of products; never so many things required quickly to offset the destruction produced by the war, and never such chances for development of new devices or new classes of work, new machinery and innumerable things as will then come, and never such close financial relation; and all of these, combined with others unnamed, might, and possibly will, operate to create almost continuously the greatest set of business conditions for 10 or 15 years following the war that have ever been experienced.

A. D. Childs, Cooper Hewitt Electric Company, Hoboken, N. J.—Our outlook for business this coming Fall and Winter are excellent. We sell particularly to the industrial field, and factories and mill very generally reflect big demand for lighting this coming Fall and Winter. In spite of the usual ordinarily moderate demand for lighting equipment during the Summer months, we have only been able to keep up with our requirements, and now apparently will have to work nights and Sundays to keep anywhere near the demand of the next few months. I feel that factory managers and those directly responsible for the output of any plant appreciate more than ever the absolute necessity of putting in the best lighting equipment. The idea of putting in one system because it shows a few dollars saving in first cost is altogether obsolete and has been succeeded by the idea that "Mr. Manufacturer" cannot afford to put in other than the very best possible light for his workmen and one which will assure maximum output.

J. W. Wooley, Oshkosh Manufacturing Company, Oshkosh, Wis.—I am rather at sea in any prediction I may make as to what is going to happen in the electrical field. My guess would probably be no better than that of anyone else. It has been our experience during the past year that very little new development has occurred in the line of tool line construction. Of course there has been considerable work done where syndicates have been extended and some property taken over, but this particular work was compulsory. As near as I can ascertain practically all development work in our particular line has been held up and now is and will be until such a time as market conditions become more settled. Our business has been very good indeed this past year, but largely on account of maintenance work. We anticipate possibly more business than we can handle if market conditions regain a sane level.

Conditions Among Jobbers.

George A. McKinlock, Central Electric Company, Chicago, Ill.—The present conditions in the electrical supply business indicate unusual activity. The great bulk of the increase in business may be traced indirectly to the preparation and organization of the industries, transportation companies, suppliers of natural products, to maintain and support a vigorous prosecution of the war. The future outlook of business is, in my judgment, largely colored by these matters.

W. R. Herstein, Electric Supply Company, Memphis, Tenn.—At the present time, so far as I can judge from our own business, there has been little, if any, increase in the consumption of electrical goods in this section, although on account of higher prices the increased volume in money has been considerable. On account of the high prices of our material at the pres-

ent time, the building of houses, the extension of circuits, and the installation of new apparatus has lagged considerably behind normal conditions. On the other hand, crops throughout the South generally promise to be unusually heavy, and this fact, coupled with the unprecedented prices now commanded by farm products, will place in the hands of the farming community a larger volume of money than they have ever had before. While the farmer is practically a negligible factor in the consumption of electrical goods, his prosperity will almost immediately extend to the country merchants, and thence through the small towns to the retailers and jobbers of larger cities. When this process has proceeded sufficiently far, we are in hopes that there will be a stimulation of such building and other operations as may call for our material.

Frank H. Stewart, Frank H. Stewart Electric Company, Philadelphia, Pa.—From the standpoint of volume the electrical supply business has never equalled the present time, but from the standpoint of number of sales there is nothing to brag about. With prices ranging from 25 to 150 per cent more than ever before, it is easy to break records without handling any more goods. The immediate outlook appears to be good, but when prices drop, adjustments that will carry a big loss not only of profit but investment will have to be made. The slump period will be a hard tussle because of high salaries, and small demand that follows a falling market.

W. S. Bissell, The F. Bissell Company, Toledo, O.—While business during the past 12 months has been exceptionally good and continues so at this writing, we are, of course, properly going through at this time a readjustment which, while it may entail commercial sacrifices that will be willingly met, will at the same time, in our opinion, create conditions in the aggregate that must of themselves make for general activity and stability as a matter of course. Surely in the conservation and greater development of resources the electrical industry must play an important part, and that should be followed up for the benefit of the trade, and thus indirectly for the benefit of the manufacturers, jobbers, central stations, contractors and dealers engaged therein.

B. B. Downs, St. Paul Electric Company, St. Paul, Minn.—The volume of our business has held up in comparison with the same time last year. This is an agricultural country and there is plenty of money in it, but building operations in the way of homes and public buildings seems to have decreased rapidly and it looks to us that such goods will only be bought which are a necessity. People will not stock up nor buy in advance in the present conditions and we fear that this condition will last until peace is declared, at which time we anticipate unprecedented activity and building.

A. W. Lindgren, Northern Electric Company, Duluth, Minn.—Conditions prevailing in the electrical business at present, and for the last two years, have certainly made it exceedingly interesting as well as hazardous for the electrical jobbers. In the main, the character of the business has changed materially on account of the large amount of industrial development which has taken place, and as a result most jobbers have probably profited thereby, but hand in hand with increasing volume has gone largely increasing operating expense. The future undoubtedly has many shoals on which many a business will be wrecked. It behooves all business men to carefully watch their stocks, credits and expenses. The present era of high prices will undoubtedly continue for some years to come.

W. W. Low, Electric Appliance Company, Chicago, Ill.—My opinion of the trade conditions in the electrical field for the balance of the year are that there will be more trouble to get material than it will be to get orders. While it is true that material is very high and central stations cannot afford to make any big extensions, the demand from the industrial field will more than make up for the loss in this field.

F. M. Bernardin, B-R. Electric Company, Kansas City, Mo.—Business of the Southwest is getting down to a war basis. In a community such as our's, general prosperity hinges largely on the prosperity of the farmer. This year the farmer of the Southwest exerted every effort to increase his production and has been abundantly rewarded. Regardless of Governmental price fixing, the farmer of the Southwest is going to have money and lots of it. This money circulating through the small town merchants and the large town wholesaler and factory leaves prosperity in its wake. The seeming conservation of the East has not become so pronounced in the Southwest. Industry is copying the farmer and putting forth every effort to increase production, knowing full well that the output will be needed. The Southwest oil industries and mines are working full time, increasing their production at assured profit. All this means steadily increasing wealth and one sound basis of prosperity. The bank clearings of Kansas City demonstrate the activity of the Southwest and the enormous outside business Kansas City does. In the week ending August 16, the Kansas City bank clearings were one hundred forty-three and one-third million dollars, and not a street car ran in the city for the entire week, reducing the downtown retail business at least 50 per cent. The week previous when cars were running, Kansas City's bank clearings were one hundred fifty-nine million dollars. Kansas City's supremacy over St. Louis in bank clearings and her position as fifth largest in bank clearings in the United States, has been clearly, definitely and permanently demonstrated. Large building operations and installations show a slight hesitancy to buy, due to the fact, no doubt, that large buyers are wanting to see what the Government is going to do about prices on metals. This hesitancy about buying is not due to any timidity over business conditions. Increasingly big business, but on more of a war basis, is looked forward to in every section of the Southwest where adjustment to war conditions has already been met by the farmers, elevators and flour mills. Other industries in the Southwest will adjust themselves to war conditions as quickly as the mills and elevators, and all stand ready to "do their damnedest" during the war.

C. D. Williams, Stuart-Howland Company, Boston, Mass.—We are finding present conditions unsatisfactory in many classes of material and in certain sections of New England, but nevertheless with a strong undertone in volume that represents a fairly satisfactory condition. It is one we find somewhat difficult to analyze and impossible to forecast. Starting from the same analysis of conditions as they are today, there appears to be a wide divergence of opinion as to the future even among persons whose estimates might be considered fairly authoritative.

R. Ackerman, Capital Electric Company, Salt Lake City, Utah.—The unique feature in the electrical supply business is that the rising market,—in fact, the exceptionally high market—has had no effect upon the demand, or if affected, it has been in the direction of spurring it on to an unusual degree in certain lines of construction and extension work beyond anything experienced in this territory for a consider-

able period previously. As to the future, we can simply express an opinion, and while we have reason to feel that business will continue to be good, we think it will show a slight decline from the present value.

C. J. Litscher, C. J. Litscher Electric Company, Grand Rapids, Mich.—We are experiencing a lull in our business at the present time, due to the large falling off in building permits. We however feel that as soon as business men adjust themselves to the present high market prices, that building operations will again open up and that our business will go back to normal.

J. B. Terry, J. B. Terry Company, Cedar Rapids, Ia.—My opinion regarding the State of Iowa is that business cannot stop. Conditions have not become serious enough at this time, and probably will not for the next few months, to make the people feel the necessity of curtailing their extravagant ways of living. There seldom, if ever, have been such wonderful crops as we have this year so far with prospects very good that the later crops are going to be bumpers. People will not keep from spending money when they are prosperous.

J. M. Hannaford, Jr., Northwestern Electric Equipment Company, St. Paul, Minn.—Our business to August 1 has been very satisfactory, although it has been a harder proposition for the jobber to secure merchandise than it has been to sell it. This because of the fact that during the past six months selling conditions have somewhat changed. The smaller customers are buying less material and the larger customers are buying greatly in excess of last year's purchases. The larger customers appreciate more readily than the small customers the advantage of service and stock and for this reason a jobber who carries a standard and complete stock can very easily get such business as he may desire. Conditions in the Northwest are also peculiar as to past and future business. The war conditions did not affect the Northwest until the execution of the draft. This, of course, with some exceptions, such as big centers, like the Twin Cities, Duluth, Fargo, Minot, Helena, Butte, Spokane, etc. With the execution of the draft and the bringing of the war forcibly home to this section, business has and may be expected temporarily to drop off, even more than heretofore as far as the small accounts are concerned. Crop conditions in our territory is such that average conditions at least should prevail and with some crops a great deal more than average conditions. Under these conditions we look for a satisfactory fall and winter business. As to conditions in the spring and for next year, my guess is as good as anyone's. The situation will depend entirely upon foreign conditions and because anyone's guess is used I will not venture to express an opinion. The only thing I might suggest you emphasize would be the fact that this year above all the jobbers' function has been brought home more forcibly than perhaps in the last ten years.

HYDROELECTRIC DEVELOPMENT ON KERN RIVER, CALIFORNIA.

Southern California Edison Company Will Build 30,000-Kilowatt Plant.

The State Water Commission of California has approved a permit issued to Southern California Edison Company, Los Angeles, under which that company is allowed to appropriate not to exceed 600 cubic feet of water per second on Kern River for hydroelectric power development. Plans outlined, in connection with application for permit, contemplate the installation of a plant of the capacity of 30,000 kilowatts, and the utilization of a total of 800 feet head. It is proposed to begin construction work by September 1, and to complete the project by July 1, 1922. The estimated cost of the installations, not including transmission lines, is $4,118,295.

NEW YORK ELECTRIC STREET RAILWAYS APPLY FOR ADVANCE IN CAR FARES.

Analysis of Labor Situation Forecasts Further Increase in Labor Costs.

The Upstate Public Service Commission of New York State recently gave a hearing on the applications of 28 electric street railway companies for an increase of fares from 5 to 6 cents. The Committee on Ways and Means to obtain Additional Revenue, the chairman of which is Joseph K. Choate, New York City, has issued Bulletin No. 5, dated August 20. This bulletin contains a synopsis of the analysis of the labor situation by Roswell C. McCrea.

His statement is founded on New York State official statistics so far as they extend and studies of conditions in 1600 representative industries of this state since 1915. Some of his conclusions are condensed as follows:

1—Street railway wages rather lower than in other enterprises requiring similar skill.

2—A similar upward trend of wage costs in various fields of similar labor skill.

3—A fall in the purchasing power of money wages as compared with the costs of subsistence, and

4—An indication of increased labor costs in the future. On the latter point he said in part:

"Prevailing tendencies suggest a continued rise. Scarcity of labor will prevail to such an extent that costs must rise. Withdrawal of workers for fighting purposes and for the expansion of war time industries will exaggerate the competition for workers. Women will undoubtedly be drawn into some avenues of employment. Immigration is at a low ebb. The rehabilitation of the warring countries will call for a working force already heavily depleted and the governing powers will do their utmost to prevent emigration. The operation of the literacy test will likewise hamper further immigration into the United States. *Labor costs will rise.* The prices of commodities and services will increase correspondingly except in those instances where freedom to increase prices or charges does not prevail. *In these latter instances bankruptcy can be avoided* only by a reduction in the volume or quantity of service, by extensive economies or by recourse to the employment of women or lower grade workers."

James S. Thompson, vice-president of the American Brake Shoe and Foundry Company, after testifying that owing to increases in costs of labor and material, brake shoes were selling for 63 per cent more than a year ago, forecast still higher wages for labor. He said:

"I and my company have been making examination into the general situation of material and labor, in order to inform ourselves as to the probabilities for a further increase in the cost of material and labor, and, from all the information in our possession we have reached the conclusion that these costs have not reached the maximum, but the probabilities are that further increases to a very great extent must be made."

Editorial Comment

Conditions in the Electrical Industry and Particularly In Its Lighting Branches

IN accordance with a custom established many years ago, we are devoting considerable space in this annual Electric Lighting and Fall Trade Number to industrial lighting, flood lighting and street lighting, and to a general survey of business conditions. These are matters of especially timely interest to the industry in general, whose business conditions were probably never so peculiar, in the sense of being at the same time abnormal and yet not unsettled.

The electrical industry has adapted itself to war conditions exceptionally well and has met the extraordinary requirements suddenly imposed on it by heavy demands accompanied with high costs and difficulties in getting materials. It has done more than this, by providing the nation with electric power and electrical apparatus to increase the efficiency of production just at the time when many industries are confronted with unusual demands for their products and with scarcity of labor.

One of the ways in which this is being done is by the large array of industrial lighting equipment of the highest efficiency that is now available. There never was a time when so many plants were required to work two or three shifts of employees to turn out the supplies needed by the nation. The increase of night work and the increasing of employment of women in industries required the very best possible industrial lighting in order to secure the output needed at maximum efficiency and the highest safety to the employees.

That there is a close relation between efficiency and good lighting is manifest to anyone who has looked into the matter. Poor lighting is accompanied not only by a reduction of output, but by an inferior quality of product, because the employees can not turn out high-quality products when continual eye-strain is involved in the effort to see. Accuracy and refined finish are obviously impossible under these conditions. Moreover, steady eye-strain gradually wears out the keenness of vision of the workmen and eventually will bring about blindness. The absurdity of shop managements continuing such conditions when they clearly work out to their own disadvantage is hard to realize, let alone the consideration of the matter from humane standpoints. These aspects of shop lighting are referred to at length in the article by Mr. Hoeveler, the first part of which appears in this issue. He points out the close interrelation of industrial accidents and poor lighting, and shows that the latter is also accompanied by inferior work and diminished output. The low cost of good lighting is also emphasized.

A splendid opportunity is therefore presented right now for bringing these matters home to factory owners. The cost of good lighting being very low and its results so beneficial, special effort should be made to impress these facts on the managements. There never was a more timely opportunity to push the campaign for good factory lighting for the benefit of the nation as a whole, and the electrical industry should feel it an obligation to promote this good cause. Since good lighting can be provided efficiently with very little increase in lighting loads, the central stations need not fear inability to provide the necessary energy on top of already overtaxed systems.

Another point in which the electrical industry has met national needs is by the way in which it has provided flood lighting for patriotic and protective purposes. There is still a considerable element in the country that professes to be unable to see the reasons why we became involved in war. Therefore, anything that overcomes this tendency to lack of loyalty at this critical time and which promotes the natural patriotic impulse of the citizenship is worthy of close attention. The protective lighting of industrial plants, public works and military and naval establishments of course is a matter that needs little comment, this being a requirement that would not have arisen if there were not present elements that attempt to cause as much disturbance as is in their power.

With respect to street lighting, an article in the current issue by Mr. Vaughn shows that the war has checked the development of new projects, but it has not hampered the continuance of work already under way. In spite of the highest prices known, street-lighting betterments are being carried out practically as projected. It is fortunate that this can be reported, because street lighting is a matter of the greatest public concern and it is to be hoped that nothing will develop to hamper further progress in this direction.

As regards business conditions in general, as reported on other pages by Mr. Forbrich, it is clear that these are decidedly abnormal on account of the continued heavy rush of business during a time of extraordinary high prices. There is prospect for continuance of these conditions for some time and the industry need fear no sudden change. The continued large demands for electrical equipment and for the supply of electrical energy, which may even increase, are bound to produce a market for electrical products which will not be diminished appreciably until a permanent peace has finally been attained.

Water-Power Bills and their Relation To Each Other

RELATIVE to pending water-power legislation there is constant need of keeping before the public certain basic facts in clear outline. If the way is to be opened for developing the nation's water-power resources it must be through the enactment of laws, such as are proposed in bills now before Congress or others of similar import. The provisions in the bills referred to, and their relations to each other, should be clearly understood. If they have any serious defects or are fundamentally wrong in any respect, from the standpoint of either the investor or the public, necessary changes should be made. If no such defects or unfair provisions exist, an effort should be made to concentrate all proper influences in their support.

The provisions of the Walsh bill have been previously explained in these columns. This is a Senate measure, now before Congress, which provides for the leasing of water-power sites on streams within the public domain, under authority of the Secretary of Interior. The control of proposed projects under such leases is applicable only to non-navigable streams. Senate bill No. 1419, changed as to certain features and reintroduced last April by Senator Shields, provides in a quite similar manner for power development on navigable waters, but under authority of the Secretary of War, because the control of navigation channels comes within the scope of his department. The Shields bill proposes amendments to an act approved June 23, 1910, which relates to the construction of dams across navigable waters. A fact which should be kept clearly in mind is that the Walsh bill and Shields bill pertain to different departments of the Government, and that both are essential to the inauguration of a broad, national policy of water-power development. Each measure would be workable independently of the other, but, viewed in the light of nation-wide demands, they may be considered supplementary to each other. The need of the hour is for a policy that will remove the obstructions and restrictions so that our water-power resources may be available as soon as possible. Both bills seem to safeguard public interest and should be enacted into laws, primarily as industrial measures, incidentally as war measures.

The Shields bill provisions, with respect to terms of lease, and regulations concerning the disposition of the project at the end of the 50-year period, are nearly similar to those in the Walsh bill. In either case the federal government may take over the project, after properly remunerating the lessee, or may grant him a permit for a second term, or may recognize the transfer of the project to a third party. But under the terms of the Shields bill the Secretary of War may stipulate a number of other conditions in the 50-year permit. One of these is to require the permittee to construct locks, booms, sluices and other structures for navigation purposes, without cost to the government, and to supply power free of charge for operating locks and accessory equipment. Another stipulation may be that if navigation improvements are not made a part of the lease, the government may construct locks and other facilities, and grantee shall furnish free power and right-of-way required, and shall pay the government reasonable charges for benefits accruing on account of headwater and storage reservoir improvements. Throughout, the Shields bill recognizes the rights and authority of the state government to regulate rates of service for power produced and distributed by the party to whom the permit is granted; but in the case of an interstate service, in which State authorities do not agree, the Interstate Commerce Commission may assume jurisdiction, and all property embraced in the project of permittee is made subject to taxation by the State in which the service is rendered. In case of any dam built or taken over by the Federal government, the Secretary of War may lease surplus water to municipalities or other public corporations for power purposes or water service.

House bill No. 4504, introduced in May, 1917, by Representative Small, is in the hands of the Committee on Interstate and Foreign Commerce. This bill is amendatory of a section of the Rivers and Harbors Act approved March 3, 1899. The Small amendment simply extends the scope of an existing statute by authorizing the Secretary of War to enter into a contract with any person or corporation, who shall undertake to construct navigation improvements on any river or harbor in return for rights and privileges in developing, producing and disposing of power on said streams in conformity with the laws of the State in which the project is situated. The terms of such proposed contracts are to run 50 years, at the termination of which the Government may elect to take over the improvement and projects, on the repayment to the contractor the amount of his investment. This bill further so amends the act as to authorize the Secretary of War to lease surplus water at dams constructed by the Government, in the interest of navigation, to parties who propose to generate power, preference being given to municipalities or other public corporations.

Electric Vehicles Not in Evidence—Why?

IN the course of a comprehensive summary on the use of "Electricity in the National Army Cantonments," which was compiled by field correspondents of the ELECTRICAL REVIEW for our August 25 issue, there appeared the statement that in only one direction did the electrical industry fail to take advantage of the opportunities which the construction of these camps offered, namely, in the transportation

of materials from city to camp and about the premises. Electric vehicles would have been admirably suited for this work since electricity for battery charging was available, and, furthermore, good roads were built to each cantonment before any construction work was undertaken. Gasoline trucks are in great demand for government services and manufacturers are finding it extremely difficult to fulfil requirements. By the use of electric vehicles in the work, therefore, the gasoline trucks that had to be employed could have been released for service in localities where they only could be used. Electric-vehicle manufacturers perhaps can offer some good reason why they seemingly neglected again to take advantage of so good an opportunity to gain world-wide recognition for the battery vehicle.

As we have pointed out on various occasions heretofore the most enthusiastic adherents of gasoline-driven motor trucks must admit that the electric vehicle has many inherent advantages. For instance, the simplicity of the electric's mechanism, consisting mainly of a standard electric motor, controller, and storage battery is an important advantage. Likewise, the freedom from starting troubles and water freezing in winter, and ease of operation, freedom from objectionable odors, etc., are all points which merit consideration. But in spite of these many advantages, the growth of the business, while considerable when taken alone, has been ridiculously small when compared to the wonderful growth of the gasoline automobile business.

There are many factors which can be held responsible, chief of which, perhaps, is lack of enthusiasm shown by the manufacturers for their own product. This enthusiasm, which is such an important element in the gasoline automobile field, was expected of the central-station companies. The electric truck was originally classed as a current-consuming device, and an attempt was made to market it on this basis rather than along the broad merchandising lines which the gasoline-truck industry found so successful. Meanwhile, the gasoline-truck manufacturers, instead of placing the burden of development on the fuel producers adopted sales policies, commensurate with the importance of their product, which have established a new era in merchandising. They were quick to realize that distribution through dealers was the only satisfactory and economical method of selling motor trucks. By means of such a system, active representation was obtained in every community, regardless of size and at a minimum of expense.

Even at the cost of a substantial discount it is generally to the manufacturer's advantage to sell through the dealer. In the long run it is cheaper, except in the large centers, and where a dealer can be signed for a definite number of vehicles per year, it steadies the manufacturers' production, distributes the burden of introductory selling and, altogether, is a safer and wiser method of securing distribution.

In spite of the advantages above enumerated, however, electric trucks have not been very generally adopted even by companies operating central stations where batteries can be charged during the night and early morning hours at a veritable minimum of expense. This is very apparent from a survey of trucks in use by electric companies which was recently undertaken by the ELECTRICAL REVIEW. It shows an overwhelming preponderance of gasoline-driven trucks as compared with electric trucks.

WHY?

Bad Public Utility Management

THE indifference to the comfort and rights of its patrons, shown by the Interborough Company of New York, in shutting down its subway service last Saturday afternoon, giving the excuse of lack of coal, is one of those obviously unnecessary and avoidable acts that seriously and too often prejudice public utility management in the minds of the public.

Messrs. Shonts and Hedley, the heads of this otherwise wonderfully well-managed transportation corporation, should be able and eager to locate the responsibility for this empty coal bin and resulting non-action, and promptly apply a permanent remedy.

The situation is well described in the following editorial from the New York *Sun* of Tuesday of this week, entitled "A Bad Time for an Empty Coal Bin":

"It caused discomfort to thousands of persons, hardship to many of them, and the irritation it occasioned has been increased by disclosure of the fact that the operating officials did not attempt any unusual method of averting the shutdown.

"The Interborough has an emergency connection with the Edison generating plant, and a contract for power with the Edison company. So far as has been shown, the Edison company was in a position to deliver electric current to the subway sufficient to operate at least 50 per cent of its Saturday afternoon trains. But the Interborough did not call on the Edison company; instead, it burned up its last scuttleful of coal, ran its trains to stations, allowed its fires to go out and let the public walk and be damned.

"Officials should bear in mind the fact that if they cannot run their railroad somebody else can, a circumstance not without significance for private operators of public utilities in a day when Government intervention in the most intimate affairs of popular concern is accepted as a necessary and desirable and even essential thing."

Intelligent foresight or prompt official action when the situation became suddenly acute would evidently have prevented this shutdown. Why did it occur? If there was any other reason than temporary indifference and incapable management the ELECTRICAL REVIEW and the public generally would like to be informed. The whole question is now being investigated by the Public Service Commission of New York and its findings will be awaited with special interest.

HAPPENINGS IN THE INDUSTRY

New Committees of American Intitute Appointed—Programs for Iron and Steel Engineers Convention and American Electrochemical Society Meeting—Coal Shipments Increasing—News Notes

NEW COMMITTEES OF AMERICAN INSTITUTE APPOINTED.

Program for Future Meetings Also Discussed by Board of Directors at Meeting in New York.

The first meeting of the Board of Directors of the American Institute of Electrical Engineers for the administrative year beginning on August 1, 1917, was held at Institute headquarters, New York, on Tuesday, August 14.

President Rice announced the appointment, in part, of the committees for the administrative year. The chairmen of the committees appointed are as follows: Finance, N. A. Carle, Newark, N. J.; Board of Examiners, A. S. McAllister, New York; Editing, W. I. Slichter, New York; Meetings and Papers, L. T. Robinson, Schenectady, N. Y.; Sections, Walter A. Hall, West Lynn, Mass.; Student Branches, P. H. Daggett, Chapel Hill, N. C.; Code, Farley Osgood, Newark, N. J.; Standards, C. A. Adams, Cambridge, Mass.; Headquarters, N. A. Carle, Newark, N. J.; Code of Principles of Professional Conduct, George F. Sever, New York; Transmission and Distribution, L. E. Imlay, Niagara Falls, N. Y.; Lighting and Illumination, Edward P. Hyde, Cleveland, O.; Telegraphy and Telephony, L. F. Morehouse, New York; Electrochemistry and Electrometallurgy, F. A. J. Fitzgerald, Niagara Falls, N. Y.; Power Stations, Philip Torchio, New York; Marine, H. A. Hornor, Philadelphia, Pa.; Industrial and Domestic Power, E. H. Martindale, Cleveland, O.; Electrical Machinery, Alexander M. Gray, Ithaca, N. Y.; Instruments and Measurements, S. G. Rhodes, New York; Protective Devices, D. W. Roper, Chicago, Ill.; Mines, H. H. Clark, Pittsburgh, Pa.

The Patent Committee and the Committee on the Development of Water Power were not reappointed, it being felt that the functions of these two committees now come properly within the scope of the newly organized Engineering Council.

Representatives were also appointed upon various joint committees and other bodies.

Guido Semenza was reappointed by the Board as Local Honorary Secretary for Italy for the term of two years ending July 31, 1919.

In accordance with the by-laws of the Edison Medal Committee, the Board elected from its own membership: John J. Carty, B. A. Behrend and A. S. McAllister to serve upon the committee for the term of two years, and L. T. Robinson to serve for one year to fill the unexpired term of a retiring member of the Board of Directors.

The action of the Finance Committee in approving monthly bills amounting to $13,108.62 was ratified.

The report of the Board of Examiners of meetings held on July 12 and August 13 was read and the actions taken at those meetings were approved. Upon the recommendation of the Board of Examiners 7 students were ordered enrolled, 88 applicants were elected to the grade of Associate, 6 applicants were elected to the grade of Member, 19 applicants were transferred to the grade of Member, and 2 applicants were transferred to the grade of Fellow.

The program of Institute meetings for the coming year was discussed. It was voted to hold the October meeting in Philadelphia on October 8, and the November meeting in New York on November 9. Final decision regarding the balance of the program was deferred until the October meeting.

IRON AND STEEL ENGINEERS TO MEET AT PHILADELPHIA.

Eleventh Annual Convention to Discuss Problems of Economy and Co-operation With Government.

The eleventh annual convention of the Association of Iron and Steel Electrical Engineers will be held at the Bellevue-Stratford Hotel, Philadelphia, Pa., September 10-14. A comprehensive program of papers has been arranged, the subjects dealing largely with economies that must be effected in the operation of iron and steel mills. A pratriotic meeting has also been arranged, at which there will be talks by prominent army and navy engineers, relating particularly to a closer co-operation with the Government.

The first business session will be held on Monday morning, at which the routine reports and association matters will be discussed. At the afternoon session there will be a paper entitled "Safeguarding Electrical Equipment," by Walter Greenwood, and a paper entitled "Heroult Electric Furnaces," by Walter C. Kennedy.

The following papers have been arranged for presentation at the two sessions on Tuesday: "Factors Relating to the Economical Generation and Use of Electric Power in the Steel Industry," by Brent Wiley; "Central Station Power Supply to Iron and Steel Industry," by Joseph McKinley and Ray L. Baker; "Electrical Reversing Blooming Mills," by Ralph D. Nye, and "Electric Drives for Reversing Rolling Mills," by D. M. Petty.

At the session on Wednesday morning there will be two papers, as follows: "Fuel Economy by Co-operation in Establishing a Better Practice in the Operation of Stokers and Boilers," by Joseph G. Worker, and "Turbo-Generators," by Richard H. Rice. E. H. Martindale, of the National Carbon Company, will present a paper at the afternoon session entitled "Manufacture, Selection and Use of Carbon Brushes." This will be followed by a patriotic meeting, at which there will be talks by prominent army and navy engineers.

The meetings on Thursday are to be under the auspices of the Standardization Committee of the

Association, at which motor, control and crane standardization reports will be presented by the respective chairmen of these sub-committees.

At the concluding session on Friday morning there will be a paper entitled "Grab-bucket Coal Hoists Operated by Alternating-Current Motors with Dynamic Braking and Regenerative Breaking," by James Farrington and R. H. McLain, and a paper entitled "Tool Steel Gears and Pinions for Mill and Industrial Service," by E. S. Sawtelle.

Friday afternoon will be devoted to a number of inspection trips, arrangements having been made to visit Cramp's shipyard, the plant of the Midvale Steel Company, and the Baldwin Locomotive Works. The annual banquet of the association will be held on Wednesday evening.

Alfred H. Swartz, of Cleveland, Ohio, is chairman of the convention committee, and John F. Kelly, of McKeesport, Pa., is secretary of the association.

AMERICAN ELECTROCHEMICAL SOCIETY.

Meeting at Pittsburgh October 3 to 6—Interesting Program of Excursions and Technical Papers.

The American Electrochemical Society's August *Bulletin* gives list of those elected to membership, applications for membership, changes of addresses, obituary notice and other information of interest to members.

Features and program of the Pittsburgh meeting, which extends from October 3 to October 6, inclusive, are announced. One feature of the session will be on application of electrochemistry and electric furnaces to the manufacture of war munitions. Several members who have been active in advisory work in connection with national preparedness will take part in this. The program of the Pittsburgh meeting is as follows:

Wednesday, October 3.—Automobile trip from headquarters, Wm. Penn Hotel, at 1 p. m., to Oakmont Country Club.
Informal dinner at 6:30 p. m.
Meeting of Publication Committee and Board of Directors, 8:00 p. m.
Ladies are invited to participate in this trip. This will be in charge of Messrs. Hitchcock and Rodman.
Thursday, Oct. 4.—Reading and discussion of papers—headquarters, Wm. Penn Hotel, until 1 o'clock.
Complimentary luncheon.
Optional excursions during the afternoon:
1. American Zinc & Chemical Company, Langeloth, Pa. (Zinc Reduction and Sulphuric Acid.)
2. Visit to the new Research Laboratory of the Youngstown Sheet & Tube Company, Youngstown, Ohio. (This laboratory is one of the best things of its kind, having been recently finished at a cost of over $500,000.)
3. Visit to Research Laboratory of the American Sheet & Tin Plate Company, Pittsburgh, Pa.
4. Optional visits to—
University of Pittsburgh,
Carnegie Technical Schools,
Carnegie Museum,
Bureau of Mines Building (new),
Mellon Institute of Industrial Research.
8 p. m., Address by Alex Dow, president of the Detroit Edison Company, on "Production of Steam from Coal," illustrated by lantern slides and followed by general discussion of the power problem.
This will be of special interest in view of the attention which has been given this subject on account of the shortage of water power at Niagara Falls and the consequent necessity of certain electrochemical industries in the East seeking additional sources of power. Mr. Dow is recognized as one of the foremost authorities on this subject.
9:30 p. m., Informal reception. Music and light refreshments.
Friday, October 5.—9 a. m., Symposium—Electrochemical War Supplies.
2 p. m., Optional excursions to:
1. Atlantic Refining Company, Pittsburgh, Pa. (Refining of crude oil.)
2. Owen Bottle Works (showing an extremely interesting automatic manufacturing process).
Note.—A special car will convey members to both these plants. Messrs. Kemery and Goodale in charge.
3. Republic Chemical Company, Neville Island (Detinning of Tin Scrap). (Use of Warner Cells for manufacture of Chlorine.)
Note.—A special car will convey members to this plant. Messrs. Turnock and Gibson in charge.
4. Radium Laboratory, E. E., Pittsburgh, Pa.
In addition to the above optional trips arrangements are under way for visiting a number of other plants, including the By-Products Coke Ovens, Chemical Manufacturing Works, etc.
There are a large number of electric furnaces in operation in the neighborhood of Pittsburgh which it will be possible for members to visit.
Friday Evening: Informal subscription dinner with a number of special features.
Saturday, October 6.—All-day excursion on special train, with complimentary luncheon. Leaving Union Station at 8:35 a. m., visiting the works of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; National Tube Company, McKeesport; large electric furnaces at Carnegie Steel Company, Duquesne, Pa.; American Window Glass Company, Arnold, Pa. (automatic blowing and manufacture of window glass).

A large number of papers have been promised for the Pittsburgh meeting—a number of which have already been passed on by the Publication Committee. It is particularly requested that members send manuscripts in at the earliest possible moment so that papers may be passed upon by the Publication Committee, printed and distributed well in advance of the meeting.

COAL SHIPMENTS FOR JULY, 1917, ARE 20.4 PER CENT OVER THOSE OF 1916.

Compilation of Facts and Figures Concerning Seven Coal Producing Sections.

The United States Geological Survey has made and published a useful compilation of the carloads of bituminous coal originating on 90 railroads, and of beehive coke on 18 railroads, for July, 1917, with comparative figures for June, 1917, and for July, 1916. The figures are segregated as to seven coal-producing groups, as follows: One. Central Pennsylvania, Maryland, and portions of Virginia and West Virginia; Two. Western Pennsylvania, Ohio and Michigan; Three. Eastern Kentucky and portions of West Virginia; Four. Alabama, Tennessee and Georgia; Five. Illinois, Indiana and Western Kentucky; Six. Arkansas, Iowa, Kansas, Missouri, Oklahoma and Texas; Seven. Rocky Mountain States, North Dakota and Washington. The totals of bituminous coal car shipments, originating on the 90 roads, for the seven groups, showed 764,965 cars for July, 1917, and 781,534 for June, 1917, and 635,244 for July, 1916. Thus, the increase for July, 1917, over shipments for July, 1916, is 20.4 per cent. The decrease of shipments for July, 1917, below those of June, same year, was 2.1 per cent; but July had 25 working days, while June had 26. This makes an average loading of 30,599 cars per day for July, and an average of 30,059 cars for June; this places the daily average loadings for July at 540 cars greater than those of June. This comparative relation between July and June shipments, for 1917, holds good, with some variation, as to all the seven groups except the third, in which there were 182,474 cars for July as against 178,177 for June.

The essence of these figures is that the rate of production for July exceeded that of June, 1917, by about 1.8 per cent; and that July, 1917, production exceeded that of July, 1916, by 29,721 cars, or 20.4 per cent as above shown. Considered in groups, the most striking increase of July, 1917, shipments over those of July, 1916, was in Illinois, Indiana and Western Kentucky, amounting to 84 per cent. The increase was substantial in all other districts east of Mississippi River.

The 90 railroads, whose haulage enters into this comparison, originated 90.6 per cent of the total railroad shipments of bituminous coal loaded at mines in 1916, and 75 per cent of the total production. Beehive coke shipments by 18 railroads for July, 1917, showed an increase of 0.4 per cent over June, 1917, and 11.5 per cent over July, 1916.

NEWS NOTES

British Columbia Electrical Contractors.—The British Columbia Electrical Contractors' Association will hold its annual convention at Vancouver, B. C., September 11 to 15. C. H. E. Williams is president of the organization.

Pennsylvania Public Service Commission Consolidates Bureaus.—The Pennsylvania Public Service Commission has merged the Bureaus of Engineering, Rates and Tariffs into one main division to be known as the Department of Engineering, Rates and Tariffs. Herbert C. Hoover, chief engineer of the Commission, will be in charge of the new division. Paul E. Fickenscher will be assistant chief of the Bureau.

Coal Cheaper Than Oil in Northwest.—Reports from Pacific Northwest is to the effect that some of the operators of cement plants in that section, who have been using fuel oil for rotary kilns, are finding it more economical to go back to the use of coal for this and for steam purposes. The coal production of Wyoming, Washington and Montana is considerable, and for economic reasons the heavy shipments of California oil to the Northwest may be temporarily checked.

Amendment to New York Utility Law to Cover Excessive Charges.—The Public Service Commission has submitted to complainants and companies interested in the recent hearings before the Board relative to the maintenance of the statutory standards of candlepower, a suggested form of amendment to the present state utility law. This amendment provides for the Commission to hear and determine the claims of consumers of electric energy or gas for refunds, etc., based upon excessive charges for service.

Edison Employees Open New Clubhouse.—Members of the Thomas A. Edison Association, formed of employees of Thomas A. Edison, Inc., and affiliated companies, West Orange, N. J., opened the new clubhouse of the organization at Valley Road and Condit Place on August 14. The building, formerly used as a hotel, has been remodeled into an ideal clubhouse and will be given over to many proposed activities of the association during the coming fall and winter season. W. DeMille Telfair is president of the club.

Two California Power Systems Are Connected.—The electric transmission lines of Northern California Power Company, of Shasta county, and the Western States Power Company, in Humboldt county, have been connected. The Western States Company was unable to meet the demands for power at Eureka and other places in Humboldt county, and this connection makes available some of the surplus energy in Shasta county. The two systems were connected at Weaverville. This required the Northern to build a 40-mile line from Kennett to Weaverville, and required the Western to extend a 9-mile line from its plant at Junction City to that place. The transmission distance from Kennett, on the Southern Pacific, to Eureka by the seashore is 105 miles. Eureka is a center of the redwood industry. The Northern California Company operates hydroelectric plants.

Will Supply Coal at Cost to Employees.—United Railways Company, St. Louis, has posted notices to the effect that it will purchase coal in large quantities to retail at cost to its 5000 employees.

Independent Telephone Association Holds Meeting.—The meeting of the members of the Independent Telephone Association of Eastern Pennsylvania, held at Allentown August 11-12, proved a highly successful affair, with representatives present from twelve independent systems, representing about 100,000 telephones. Addresses were made by J. H. Cross, Philadelphia, and W. S. Vivian, Chicago. H. A. Oberdorf, Columbia, presided.

Purchasing Agents Will Meet in National Convention.—National Association of Purchasing Agents will hold its 1917 convention at the William Penn Hotel, Pittsburgh, Pa., October 9, 10 and 11. This hotel is to be convention headquarters, where all sessions and gatherings, public and closed, will be held, including the annual banquet. Men of national prominence are to be present as speakers. The details of the convention are being arranged by Robert F. Blair of Pittsburgh Gage & Supply Company. The president of the National Association is E. L. McGrew, of Standard Underground Cable Company. An attendance of 1500 members is expected. This meeting assumes importance, as the association is being recognized as a clearing house of information of interest to purchasing agents and the houses which they represent.

Oregon Electrical Contractors and Dealers.—The second annual convention of the Oregon Association of Electrical Contractors and Dealers will be held at Eugene, Ore., September 17-18. Among the addresses will be one on "Business Methods and Outlook" by C. D. Rorer, president of the Bank of Commerce, Eugene; on "Oregon Electrical Industry" by Franklin T. Griffith, of Portland, president, Portland Railway, Light & Power Company; "The Need of Proper Electrical Inspection and How to Organize an Electrical Inspection Department" by I. F. Dunlap, chief electrical inspector, Bureau of Buildings, Portland; "The Electrical Jobber" by J. J. Colwell, northwest manager, Western Electric Company, Seattle. A delegate will be chosen at this convention to the national convention to be held in New Orleans in October. F. C. Green, of Portland, is president of the association.

New Jersey Utility Board Denies Increase in Gas Rate.—The Board of Public Utility Commissioners has denied the application of the New Jersey Northern Gas Company, operating at Flemington, Lambertville and vicinity, a consolidation of the Flemington and Lambertville Gas Light Company, for permission to advance their rates from $1.40 to $1.90 per 1000 cubic feet, effecting the increase by imposing a fixed or service charge of 50 cents per month for each customer. The company maintained that the cost of manufacturing is 30 cents higher per 1000 cubic feet than in 1916, when the net cost was 84.9 cents for such quantity. In its decision, the Commission holds that if the high cost of manufacturing gas continues, increased revenue will be needed, but that the testimony on the application at issue did not indicate how much added revenue would be received from the proposed advance. In regard to the service charge, the Board stated that there was no satisfactory proof that such charge bears a proper relation to the cost of "readiness to serve."

New Electrical Appliances

A Review of the Latest Developments and Information Respecting Electrical and Kindred Mechanical Appliances

Miners' Electric Safety Lamp.

The work of the miner being entirely underground requires some means of effective lighting, so that he may carry on his work and pass back and forth through the various tunnels with safety. The miner's cap lamp is used almost universally, because the permanent lighting of the various underground workings would otherwise be very expensive. In coal mines, where gaseous conditions are troublesome, special requirements are laid down for the miner's lamps. The long study of the subject by the United States Bureau of Mines has led to the formulation of rigid specifications for miners' lamps, especially for use in gaseous localities, where every precaution must be taken to prevent possible explosion of the gases. The electric lamp properly safeguarded is the best lamp to use for this purpose and a number of lamps meeting the Bureau's specifications have been listed as permissible lamps.

New General Electric Miner's Safety Cap Lamp Complete. Enlarged View of Special Mazda Lamp Bulb Used.

One of the lamps of this type recently added is manufactured by the General Electric Company, Schenectady, N. Y. It is of very simple, but rugged construction. The lamp is a special form of Edison minature Mazda lamp, which is illustrated in the accompanying small cut. This has the terminals at each end and can be readily snapped into place in the reflector and housing that is mounted on the cap. The lamp is rated at one candlepower and is supplied from a two-volt Ironclad-Exide lead storage battery, which is placed in special case and carried on the miner's back. A special protected connecting cable is used between the cap lamp and the battery.

The battery jar is inclosed in either a sheet-steel or cast-aluminum box. Both of these types of special boxes are of very strong construction, so as to withstand the most severe service. The cover has special clip terminals that fit the terminals of the cell and connect with the cord, so as to make it impossible to disconnect the cord without unlocking the cover; the arrangement is such that these covers are locked in place at the office from which the miners start before beginning their day's work. The cover also has a small vent plug, which is of such construction as to positively prevent spilling of the electrolyte.

The cap lamp consists of a drawn-steel shell, within which is a white porcelain-enameled steel reflector. The lamp is held between special safety spring terminal contacts. The strong glass front is mounted against a soft rubber gasket, which cushions it and makes a tight joint. It is the common practice to use the lamps as a means of checking the men in and out of the mine. The batteries are collected at the office and placed on racks and charged in series on a special charging circuit. The batteries have ample capacity for a 10-hour day.

Automatic Disconnecting Hangers to Permit Maintaining Inaccessible Lamps Clean.

The requirements for safety and efficiency in modern industrial establishments call for a good system of lighting and one which can be easily maintained in proper condition. In large establishments in particular lamps are likely to be mounted at considerable heights above the floor and it is quite common to place the lamps above the traveling crane, and on or close to the roof trusses. This makes these lamps very effective from the illumination standpoint, but very difficult of access for properly maintaining them. In many cases a traveling crane is used to give access to the lamps, but even this involves some hazard on the part of the cleaner and ties up the crane for a considerable period when it may be needed for its ordinary functions. Even outdoors lamps mounted on high poles, which is the proper method of mounting in order to get best illumination results, are not easily reached, and therefore are likely to be neglected.

While arc lamps were used very extensively, it was, of course, necessary to use some lowering gear or else devise some method of reaching the lamps by means of ladders or otherwise. Since arc lamps are going out of use and being replaced rapidly by high-efficiency tungsten lamps, there is a tendency to neglect maintenance. It is well known that in all industrial establishments an accumulation of dust on the lamps themselves, or on the reflectors, greatly lowers the efficiency of the unit in a short time and it is common to find the efficiency reduced 50 to 60 or even more per cent. This is especially true in foundries, steel works, cement mills and other places where there is a great deal of dust, smoke or vapor.

Some years ago there was developed a method of

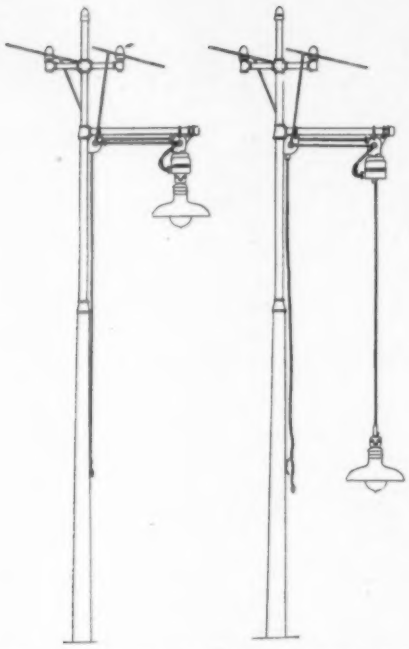


Fig. 1—Thompson Automatic Cutout Hanger Applied on Street or Yard-Lighting Fixture—Raised and Lowered Position.

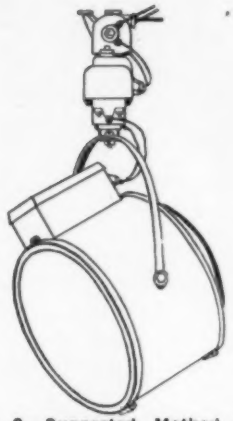


Fig. 2.—Suggested Method for Mounting Flood Lamps on Thompson Hanger to Avoid Climbing High Poles, Towers, Etc.

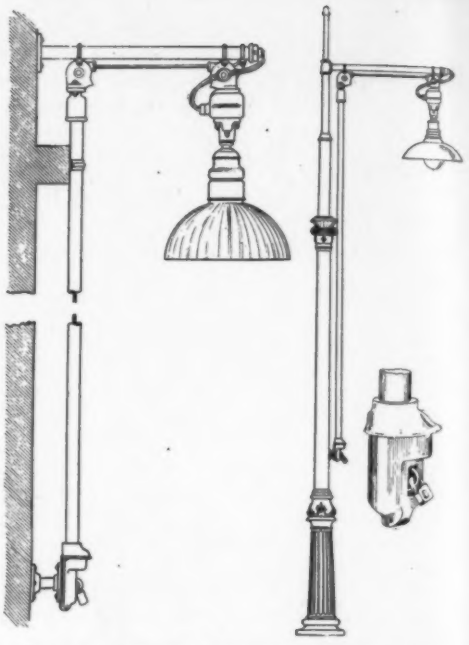
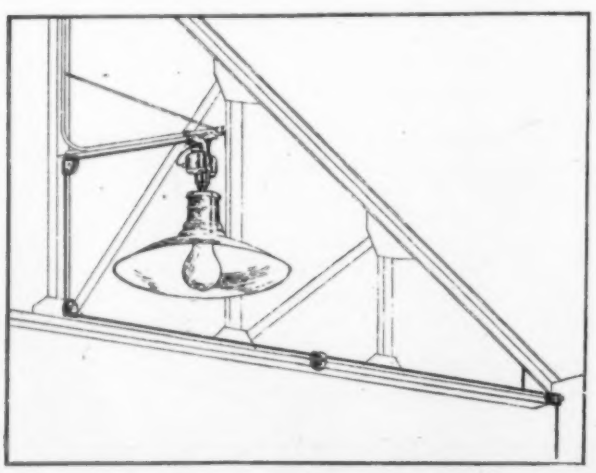


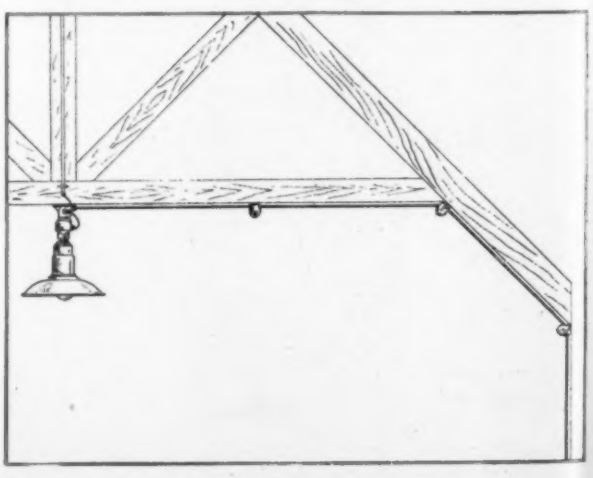
Fig. 3.—Thompson Automatic Cutout Hanger with Rope Inclosure and Lock as Used on Brackets and Poles.

lowering lamps effectively and safely without the need of having dangling loops of circuit wires. The device which permitted this was the Thompson automatic cutout hanger, or safety disconnecting lowering hanger, as it is also known. A general description of this device was published in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of August 9, 1913. It will suffice here to state that this is a hanger which permits the lamp to be lowered entirely free from its circuit. An automatic cutout is included in the device, which disconnects the lamp before it is lowered and which reconnects the lamp when it is again pulled up into place. This means that the circuit wires are permanently connected to the upper portion of the hanger and that when the lamp is lowered for trimming, cleaning or lamp renewal, it is entirely dead.

In Fig. 1 are shown two positions of an outdoor lamp, which is fed from overhead circuits. The first sketch shows the lamp in service. The second shows the lamp lowered. At the bottom of the upper portion of the hanger can be seen a wedge-like extension, which compels the lamp to be turned into a definite direction when it is again pulled back into place. This means that an angle reflector unit, a projector unit, or any other lamp which must be turned in a definite direction, can be used with this hanger with the assurance that it will always be pointed properly. Fig. 2 shows a method of hanging a flood-light projector on one of these hangers, which can be used with practically any type of lamp. This makes it very convenient to use these hangers for outdoor lighting in special services, such as protective lighting with projector or angle-reflector lamps, mounted on high poles or at the edge of the roofs of buildings.

Various accessories have recently been developed for these hangers, which make them still more useful. One of these is the safety rope inclosure, which is shown in the various sketches of Fig. 3. It may be seen that the ordinary accessible portion of the rope is entirely inclosed within the pipe and the lower end





Figs. 4 and 5.—Two Methods of Mounting Lamps on Roof Trusses in a High Shop, Using Thompson Automatic Cutout Hanger to Avoid Dangerous Climbing to Get at Them.

of it is securely locked in place. This protects the rope and the line from tampering when used in exposed places. This feature can be adapted both to lamps mounted on brackets on buildings, or to lamps mounted on poles; it can, in fact, be used in almost any method of mounting a lamp and is especially suitable for street lamps. A comparison of Figs. 1 and 3 shows that the hanger may be used both with lamps fed from overhead or underground circuits and with open or inclosed wiring.

Figs. 4 and 5 show two methods of mounting lamps from roof trusses in a high shop building. A series of special pulleys has been developed, both of the corner and idler types, to permit running the lowering rope to any place that is convenient. It is evident from these two last illustrations that in places such as these shown the lamps would receive very infrequent and probably very unsatisfactory attention if they were not provided with a device like this described.

These hangers have been used in very large numbers in steel mills, foundries, erecting shops, railroad yards, docks, as well as for street lighting and in all kinds of industrial establishments where lamps are required to be mounted high. They are made by the Thompson Electric Company, 5606 Euclid Avenue, Cleveland, Ohio.

Improved Street-Lighting Fixtures.

The more stringent requirements for street lighting, as well as the advance in the art, has brought about the development of new street lighting equipment. The Line Material Company, South Milwaukee,

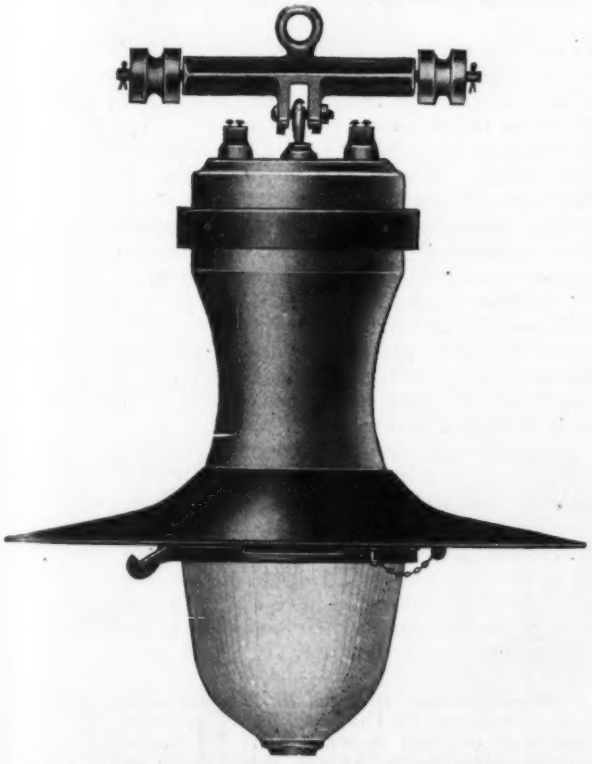


Fig. 1.—Improved Porcelain-Incased Compensator Fixture.

Wis., has recently made a number of improvements in its fixtures of which two are illustrated herewith. These are arranged so that the parts are interchangeable, so as to permit adding to or changing the type of any fixture as occasion demands. A feature of both of these fixtures is what is known as the "hang-level arm with reversible plug," which is a special feature developed by the Company. This consists of a swinging joint between the arm and the canopy and insures having the fixture always hang level, in spite of any

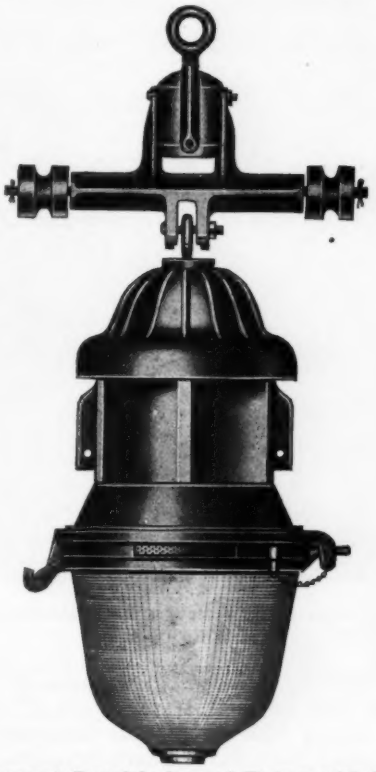


Fig. 2.—Compact Porcelain-Incased Fixture with Refractor.

unbalanced pull on the feed wires. The arms are designed with a slot at the bottom, to take a rectangular plug. This arrangement allows the fixture to swing freely when it is inserted in one position, or it will hold it rigid if reversed.

The fixture shown in Fig. 1 is said to be the first porcelain-incased compensator fixture placed on the market. Brown, heavily glazed porcelain body is proving very popular, because of its high insulation, durability, attractive appearance and low maintenance. After every rainstorm it is cleaned and looks as bright as new. The socket in this fixture can be readily adjusted in height, so as to suit different sizes of lamps and any size of compensator can be inclosed in the housing, or the fixture can be used without compensator.

The fixture shown in Fig. 2 consists of a ventilated iron top securely fastened to a brown glazed porcelain body. The latter is large enough to give ample room for admitting the hand to clean the interior and to adjust the height of the socket for different sizes of lamps. The fixture shown has a refractor, which is held by a strongly built and easily operated band. This fixture can also be provided with the large reflector shown in Fig. 1. The outside of the fixture can be given a special verdi-bronze finish, which gives it a special attractive appearance and wears well.

Ornamental Street Lighting with Union Metal Standards.

Ornamental street lighting has passed through a number of stages of development in recent years.

Day View of Ornamental Street-Lighting Standards in Allentown, Pa.

Since cluster posts became quite common there was call for the development of standards of special design that would differentiate the community where they were used from the ordinary installations of this type. The development of high-efficiency tungsten lamps of the gas-filled type also made it desirable to employ single-unit standards instead of cluster posts, on account of the reduced installation and operating cost thereby attained.

Among manufacturers of street-lighting equipment the Union Metal Manufacturing Company, Canton, Ohio, has for some time been producing ornamental equipment that is out of the ordinary and a number of installations of this kind have recently been made that have attracted unusual attention. Herewith are shown two views of the main street in Allentown, Pa., in which one of the most unique ornamental standards has been installed throughout the length of the street. A special form of fluted ornamental standard is used, upon which is mounted a flower bowl, which

Night View on Main Street in Allentown.

Special Lantern Standard Used in Cleveland, Ohio.

maens a particularly ornamental effect by day as well as by night. During the winter these bowls were filled with balsam boughs and gave a very pleasing effect to the snow-covered street. During the summer flowers have been planted and give a very attractive display of color. The installation in this case has been enhanced by the fact that all wood poles, trolley poles, awnings and other obstructions have been removed from the street, thus making the ornamental standards particularly prominent.

Another example of a unique type of standard is that installed in Cleveland, which was described in our issue of April 29, 1916. These standards are surmounted by a special octagonal lantern, containing a prismatic refractor. A view of one of these standards is shown herewith.

Another splendid example of special street lighting is that installed in Salt Lake City, Utah, where ornamental three-light stanlards using luminous arcs have been installed. This splendid installation was described in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN October 7, 1916. The three installations briefly referred to have attracted exceptional attention on account of their both unique and attractive appearance.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has recently taken orders for electric motors of the total capacity of 2250 horsepower, to operate Vulcan hoists in the Western Pennsylvania and West Virginia coal fields. Among these was an order for a 700-horsepower alternating-current motor from Rachel Gas Coal Company, Downs, W. Va., for its main hoist, and a 300-horsepower motor for a supply hoist, giving this shaft a capacity of 3000 tons per day. The Lincoln Gas Coal Company, Washington county, Pa., ordered two 300-horsepower motor for its main and supply hoists at a 512-foot shaft; and a 350-horsepower motor was ordered by the Diamond Coal & Coke Company for installation at its new shaft in Plum Creek district.

Newest Types of Lighting Fixtures

Illustrations of Representative New Types and Designs of Fixtures Being Marketed by Leading Fixture Manufacturers

Reedware semi-indirect bowl and shower fixture. Three pe dent shades lined with cretonne or silk; 10-inch glass bowl. Reed chains. Chicago Reedware Manufacturing Company, Chicago.

Reedware candle bracket with shade lined with silk or cretonne. Extends 8 inches from wall. Diameter of canopy 5 inches, of shade 4½ inches. Chicago Reedware Manufacturing Company, Chicago.

Reedware three-light candle chandelier with fabric-lined reed shades and reed chain. Also made for four, five or six lights. Chicago Reedware Manufacturing Company, Chicago.

Two-light candle bracket, Louis XVI style, to match chandelier shown at right. Can be trimmed with silk shades. Edward Miller & Company, Meriden, Conn.

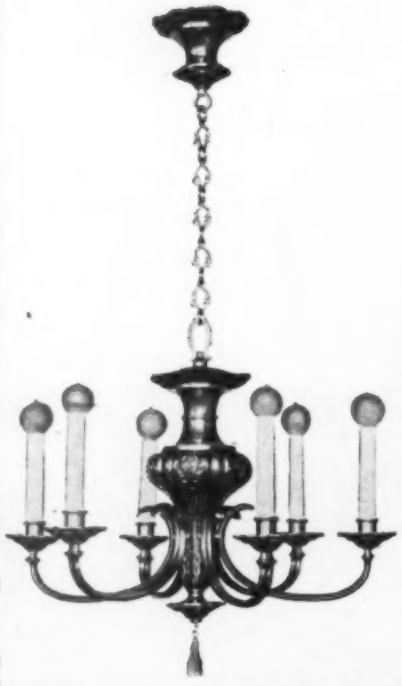
Louis XVI chandelier. Stem covered with silk cord and finished with heavy silk tassel. Silk shades. Antique gold finish. Edward Miller & Company, Meriden, Conn.

Indirect fixture with reinforced composition bowl with rippled surface and mirror reflector. Designs for any period, size and finish. American Reflexlite Company, Columbus, Ohio.

Five-light candle fixture of Colonial design especially suitable for living room. Silk shades. Length, 42 inches; spread, 17 inches. Brassart Fixture Company, New York, N. Y.

Single-light Colonial fixture for entrance hall. Etched glass globe. Length, 30 inches; spread, 9 inches. Brassart Fixture Company, New York, N. Y.

Five-light fixture of Colonial design suitable for dining room or living room. Length, 36 inches; spread, 15 inches. Brassart Fixture Company, New York, N. Y.

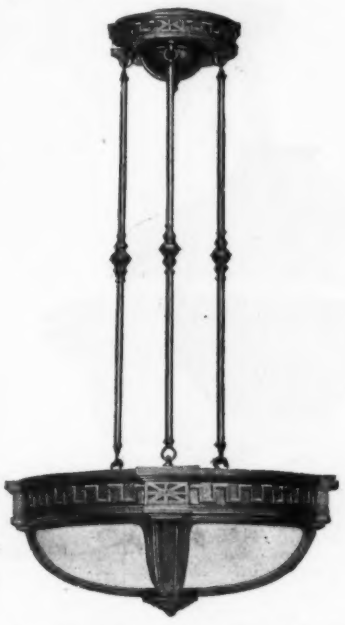


Six-light dining-room candelabra fixture of Sheffield design. Length, 42 inches; spread, 23 inches. The Scott-Ullman Company, Cleveland, Ohio.

Combined direct and semi-indirect fixture for library or dining room. Length, 42 inches; spread, 16 inches. The Scott-Ullman Company, Cleveland.

Six-light Colonial living-room fixture with astral cut-glass globes. Length, 36 inches; spread, 20 inches. The Scott-Ullman Company, Cleveland, Ohio.

Colonial hall lantern with clear glass cylinder and four candle lamps. Silk cord and tassel on stem. The Scott-Ullman Company, Cleveland, O.



Luminous-bowl indirect fixture. Contains mirrored glass reflectors for indirect lighting. A small lamp below these softly illuminates glass panels of bowl. National X-Ray Reflector Company, Chicago, Ill.

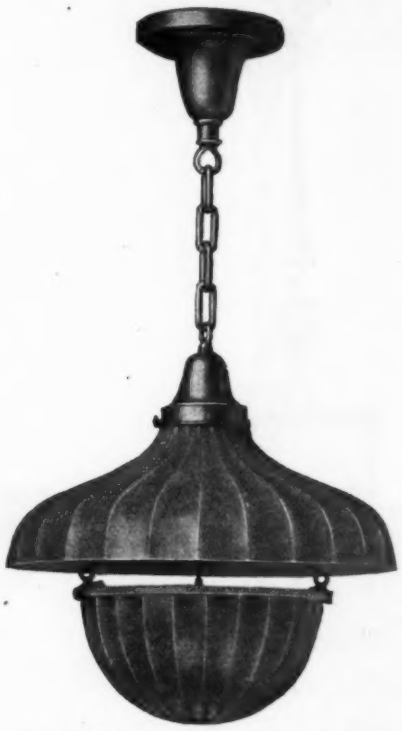
Fixture for fine indirect lighting with single X-Ray reflector for 300 to 500-watt lamps. Bowl with reflector can be readily lowered. National X-Ray Reflector Company, Chicago.

Beardslee semi-indirect unit with 14-inch Calcite glass bowl. Length over all, 15½ inches. Brush finish. Beardslee Chandelier Manufacturing Company, Chicago, Ill.

Danzar special semi-indirect unit of ornamental type for large business office. Upper reflecting dome of opal glass, permitting some light on ceiling. Bowl is one piece, upper part of clear glass and lower part with white enamel smooth surface. Made in various sizes for 100 to 500-watt lamps and in ceiling and pendant types. Beardslee Chandelier Manufacturing Company, Chicago.

Semi-indirect fixture with 9-inch Doric reflector and 5-inch diffusing bowl. For 40 to 60-watt lamps. Lighting Studios Company, New York.

Combination of 11-inch Doric reflector, 7¾-inch Doric diffusing bowl, 2¼-inch adapter, chains and safety clips. For 100 to 200-watt lamps. Adaptable to any fixture with a 2¼-inch fitter. Lighting Studios Company, New York.



Semi-indirect fixture, 30 inches long, with 15-inch Doric reflector and 10-inch Doric diffusing bowl. For 200 to 300-watt lamps. Brushed brass finish. Lighting Studios Company, New York.

Small lantern for porch lighting from ceiling outlet. Lantern is 5 by 9 inches with glass panels of any color. Herwig Art Shade & Lamp Company, Chicago, Ill.

Entrance standard with fluted shaft. Height to globe 24 inches. Herwig Art Shade & Lamp Company, Chicago.

Cast pocket lantern slightly Gothic in design. Made in three parts for easy installation and wiring. Lantern size: Length 15¾, width 9¾, depth 4¼ inches. Herwig Art Shade & Lamp Company, Chicago.

Brascolite semi-indirect unit. White enameled steel reflector. Ten-inch glass bowl with colored flower decoration. For 50 to 100-watt lamps. Luminous Unit Company, St. Louis, Mo.

Brascolite semi-indirect unit. White enameled reflector with opal glass panels to illuminate ceiling. Adam etched 12-inch bowl. Fixture length 36 inches, outer diameter 20 inches. Luminous Unit Company, St. Louis, Mo.

Brascolite unit with ivory-finished band, white enameled steel reflector and wisteria-colored decorated 9-inch bowl. For 50 to 100-watt lamps. Luminous Unit Company, St. Louis, Mo.

Brascolite unit. Composition body, old-gold finish, white enameled steel reflector. Rose-decorated 11½-inch bowl. Outside diameter 18 inches. For 75 to 200-watt lamps. Luminous Unit Company, St. Louis, Mo.

Perfeclite indirect unit with multiple-mirror reflector concealed in bowl, consisting of about 30 small mirrors at different angles. Upper reflector of white porcelain surrounded by light iron band. Made in various sizes, also for hanging suspension. The Perfeclite Company, Seattle, Wash.

Mohrlite semi-indirect unit made in various sizes for type C lamps from 75 to 500 watts. Designed for easy wiring and cleaning. The Mohrlite Company, Urbana, Ohio.

Bowl-supporting hook. Flat steel spring secured to hook body engages lip of bowl and is tightened by set screw. Peerless Light Company, Chicago, Ill.

American adjustable ceiling fixture. Made in lengths from 7 to 10 feet with special universal thumb-nut adjusting joints. Arms are hollow steel. For use where adjustable local light is needed. Also made in brackets and floor lamps. American Fixture Company, Milwaukee, Wis.

Pull-a-lite semi-indirect fixture with patented individual pull-cord control for each lamp and attachment plug at bottom concealed by silk tassel. H. A. Bauer, Lansdowne, Pa.

Kramer adjustable floor lamp with smokers' attachment. Easily extended from 40 to 56 inches height through telescopic adjustment with air cushion. Special thumb-nut angle adjustment. Base 10 inches in diameter. The Imperial Brass Manufacturing Co., Chicago.

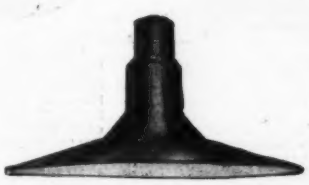
Ohmlite ceiling fixture with special refracting and diffusing planes. Designed for giving close approach to daylight in stores where color matching is done. For 100 and 200-watt lamps. Moran & Hastings Manufacturing Company, Chicago.

Ohmlite "daylight" fixture with holder to fit fixtures now in place. Used in department stores, millinery and tailoring establishments. For 100 and 200-watt type C lamps. Moran & Hastings Manufacturing Company, Chicago.

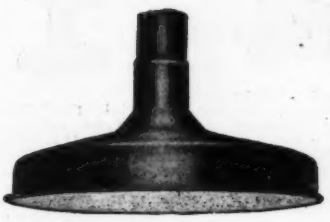
Maxolite angle reflector. Heavily enameled steel. Made in several sizes. Central Electric Company, Chicago, Ill.

"Always Vertical" suspension. Designed to permit fixtures to hang vertical even when outlet box is not level. Central Electric Company, Chicago.

Maxolite deep - bowl steel reflector. Made in one piece and equipped with "easy-to-wire" fitting. Central Electric Company, Chicago.

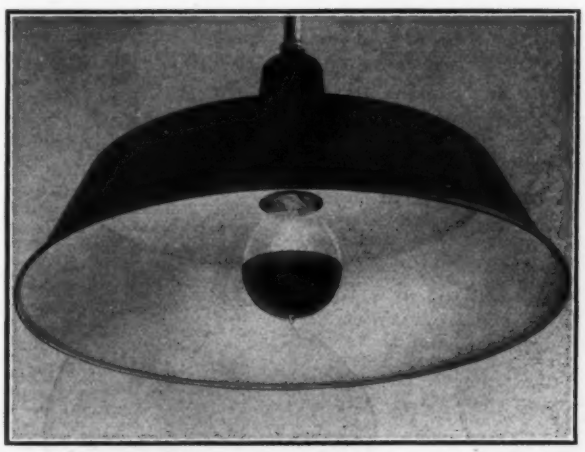


Maxolite flat-cone reflector. A one-piece steel unit with type R "easy-to-wire" fitting. Central Electric Company, Chicago, Ill.



Maxolite skirted-cone steel reflector. Provided with type R fitting and made in a single piece. Central Electric Company, Chicago.

Reflecto-Cap indirect unit for industrial plants. Designed to eliminate glare and yet provide strong and well distributed light from 200-watt type C Mazda lamp.



Silver cap on bottom of bulb cuts off direct light and throws same onto porcelain enamel reflector. Ivanhoe Regent Works of General Electric Company, Cleveland, Ohio.

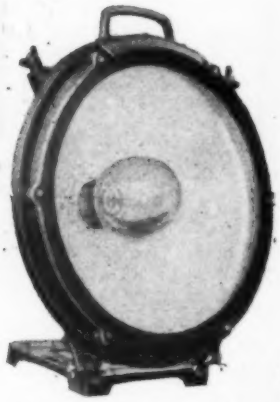
Hubbell porcelain-enameled steel reflector with extensive distribution. Japanned ventilated corrugated cover over strap holder and reflector neck. Harvey Hubbell, Inc., Bridgeport, Conn.

Hubbell distributing reflector. Paint enameled green outside, white inside. Porcelain keyless socket and strap holder. For 100-watt type C Mazda lamps. Harvey Hubbell, Inc., Bridgeport, Conn.

Hubbell angle reflector with strap holder and mogul socket for 500-watt lamps. Porcelain enameled green outside, white inside. Harvey Hubbell, Inc., Bridgeport, Conn.

Universal flood - light projector Designed for adaptability to general flood-lighting purposes. Wide-angle reflector. For 200 and 400-watt Mazda projector lamps. George Cutler Company, South Bend, Ind.

Imperial flood-light projector, type SCE, for use with 1000-watt Mazda C lamp. Ventilated hood. Spring-tension trunning mounting. Swivel base. Reflector diameter, 16 inches. Crouse-Hinds Company, Syracuse, N. Y.



G. E. form L-1 flood-light propector with 16-inch aluminum parabolic reflector in cast-iron casing. Convex glass in door. Beam divergence, 10 to 16 degrees. General Electric Company, Schenectady, N. Y.

Sunbeam 1000-watt flood-light projector. Can also be mounted on pipe bracket. Special ventilation. Convex front glass 19¼ inches diameter held by asbestos gasket. Pittsburgh Metal Spinning & Stamping Company, Pittsburgh, Pa.

Mogul flood-light projector for 300 to 1000-watt lamps. Ventilated and hinged top hood to give access to focusing and adjusting mechanism. Adjustable stand. National X-Ray Reflector Company, Chicago, Ill.

Luminous unit reflector. Made with 10 and 14-inch parabolic metal reflector. Focusing adjustment from outside. For 200 to 500-watt lamps. Trunnion and swivel mounting. Luminous Unit Company, St. Louis, Mo.

Davis Sunlight flood-lighting projector for 1000-watt lamps. Parabolic metal reflector. Ventilated case. Wired-glass front. Trunnion and swivel mounting. American Lighting Company, Chicago, Ill.

Activities in the Trade

Standard Electric Time Company, Springfield, Mass., will build a three-story addition to its plant on Logan street to cost about $25,000.

Electric Welding Company, 220 West Forty-second street, New York, has increased its capital from $24,000 to $250,000 for expansion.

Novelty Incandescent Light Company, Emporium, Pa., will build a new addition, about 85 by 90 feet, to its works at St. Marys to cost about $10,000.

Hartford Faience Company, Hartford, Conn., manufacturer of electrical porcelain goods, will erect a new extension to its works, about 40 by 80 feet.

Electric Auto-Lite Corporation, 244 West Forty-ninth street, New York, a Delaware corporation, has increased its capital from $13,000,000 to $15,000,000.

Osterhout Electric Company, Philadelphia, Pa., has leased a three-story and basement building at 1013 Race street for an electrical supply house. Frederick C. Osterhout is head of the company.

Line Material Company, South Milwaukee, Wis., has issued a new split-leaf sectional street fixture catalog, which is unique and interesting and contains some rather startling information in regard to scientific street illumination.

Adams-Morgan Company, Montclair, N. J., has been organized to operate an electrical specialty business on Aborn Place. Paul F. Godley, 105 Bellevue avenue, and Safford Adams, 69 Brookfield Road, Montclair, head the company.

Westinghouse Lamp Company, 165 Broadway, New York, has completed the erection of its new plant on Pennington avenue, Trenton, N. J., and will immediately install equipment for operation. It is expected to commence manufacturing at the new works at an early date.

General Electric Company has awarded a contract to Edward M. Waldron, Inc., 665 Broad street, Newark, N. J., for the construction of a two-story brick and reinforced concrete addition, 130 by 250 feet, to its Harrison, N. J., lamp works.

Belden Manufacturing Company, Chicago, has issued catalog No. 7 relating to electric wires, cables and cordage. The company's factory and general offices are at Twenty-third Street and Western Avenue. The catalog referred to contains a most useful compilation of information for those in the trade or electrical construction. Many tables and convenient data are given.

The Thompson Electric Company, 5606 Euclid avenue, Cleveland, O., has issued a number of folders calling attention to the importance of keeping lamps and reflectors clean in industrial plants in order to maintain an effective and efficient lighting system. Where the lamps are mounted high or in places difficult of access it is shown that the lamp equipment will not receive proper attention and the attention it receives will involve considerable hazard to the cleaner. This condition is remedied by the Thompson automatic safety cutout hanger or disconnecting lowering device, which is described and illustrated.

The Varney Electrical Supply Company, Indianapolis, Ind., wholesale dealers in electrical supplies, are moving into large new quarters at 121-123 South Meridian street. The new quarters consist of a three-story and basement brick building and gives the company 40,000 square feet of space—more than twice the space heretofore occupied. They will have 50 feet of show-window space, which will be used to show their various lines. The first floor will be entirely devoted to offices and sales rooms and 90 feet of electrically lighted show cases will be available.

The Knudsen Packless Swivel Joints, manufactured by Universal Valve Company, Burlington, Wis., under the Knudsen patents, make practicable the use of iron pipes for steam, air, gas and ammonia lines where flexibility is required. This joint is held tightly against a ring of babbit metal by the tension of a cast iron spring, making possible the elimination of packing. These springs, unlike steel springs, are unaffected by heat and cold, since cast iron has no temper. By the constant pressure of the spring under all working conditions the joint cannot leak.

National Lamp Works of the General Electric Company, Cleveland, Ohio, will build a new three-story plant at Harrison and Flournoy street, Chicago, to be occupied by the Illinois Miniature Division of the works. The structure will cost about $60,000.

Ross Power Equipment Company, Indianapolis, Ind., dealers in electrical, steam, gas, oil and power machinery, furnished the Fort Benjamin Camp with its machinery equipment, including seven large centrifugal pumps with motors, transformers, etc. Among other recent shipments was a large direct-connected generating set for the Keller Coal Company, Hillsboro, Ill., a large engine for the Minnesota-Ontario Power Company, International Falls, Minn., a boiler equipment for the Anderson File Company, Anderson, Ind., and a motor-driven pump equipment for the L. S. Ayers Building, of Indianapolis.

Faries Manufacturing Company, Decatur, Ill., has issued its 12-page, illustrated Bulletin No. 25, giving revised prices of metal shades and reflectors. The forty cuts show this company's numerous styles of shades and reflectors, with patent collar lock holders, and in each case is given the watt-capacity of lamp to which it is suited. The shades are made of steel and aluminum, usually finished in green enamel on the outside, with an inside finish of frosted aluminum for some styles, and for others of porcelain enamel or aluminum white enamel. The frosted aluminum finish was originated by this company. The reflectors comprise the parabola of different sizes and the half-shade, made of frosted steel, frosted and polished aluminum, brushed brass and oxidized copper.

Miller-Owen Electric Company, Pittsburgh, Pa., which specializes in used machinery and electrical repair work, is doing a very flourishing business. As an example of its facilities, a recent incident is cited where the H. C. Frick Coke Company, whose boiler in the Leckrone Mine was wrecked and the plant, of course, was closed down. The Frick Company telephoned the Miller-Owen Company, at 8 o'clock in the morning that it would require a rotary converter or motor-generator set or sets, totaling 500 kilowatts. A 300-kilowatt G. E. type rotary convertor was shipped from Cleveland, Ohio, by express two days later. This was set and placed in service three days later. This machinery weighed 50,000 pounds. The balance of the set was secured in Milwaukee and shipped by express a few days later. This is an example to prove that the legitimate dealer in used machinery has established a reputation and gained the confidence of the public. It might be added that the 300-Kilowatt machine mentioned above was taken from the old plant of the Willard Storage Battery Company, in Cleveland, and was of no further use to this company because of the fact that its new quarters needed larger machinery. The Miller-Owen Company states that new converter equipment needed by the Frick Company would have taken 10 months to secure.

Westinghouse Electric & Manufacturing Company recently issued a bulletin on "Oil Circuit-Breaker Accessories," showing the means of obtaining any combination of tripping and signaling that may be required. Trip-magnet frames and coils are listed for obtaining underload, undervoltage, overload, over-voltage, series and shunt trip. Several, and in some cases all, of these can be applied on the same breaker to act with the standard automatic overload trip mechanism. Control switches are listed for controlling the operating circuit of electrically operated breakers. These can be connected with signal lamps to indicate the position of the breaker. One style has signal lamps mounted on its cover-plate; and to control the signal lamp circuits, "signal and shunt-trip cutout switches" are shown. These can be so connected as to light the proper lamps to indicate the position of the breaker at all times; they are also used to open the shunt-trip circuit when the breaker opens. With a double-throw breaker, or with two single-throw breakers connected as a double-throw break, it is often desirable to have the throws so connected that with one throw closed it is impossible to close the other, and vice versa. This can be accomplished on electrically-operated breakers by interconnecting the operating circuit through a "signal and shunt-trip cutout" switch; with manually operated breakers, it is accomplished by an interlocking bar with a suitable bracket.

Latest Approved Fittings

The electrical fittings listed and described in this department have been approved by the Underwriters' Laboratories, Incorporated, after examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association

Cabinets and Cutout Boxes, Sheet-Metal.—John Mesker, 5165 Penrose Street, St. Louis, Mo.
Listed August 13, 1917.

Cabinets and Cutout Boxes, Sheet-Metal.—Electric Steel Box Company, 900 West Lake Street, Chicago, Ill.
Listed July 13, 1917.

Conduit Fittings—Hangers. — Minerallac Electric Company, 1045 Washington Boulevard, Chicago, Ill.
"Minerallac Conduit and Cable Hangers" of pressed steel, in "Standard," "Intermediate" and "Terminal" types, catalog Nos. 0 to 6 inclusive.
Listed July 30, 1917.

Cord for Electric Heaters, Portable Flexible. — Belden Manufacturing Company, Twenty-third Street and Western Avenue, Chicago, Ill.
Marking: blue and yellow threads, laid parallel with wire between insulation and braid, or blue and yellow threads woven parallel in braid.
Tag on coil to read: National Electrical Code Standard.
Listed July 3, 1917.

Electric Ranges.—George M. Clark Company (Division of American Stove Company), 179 North Michigan Avenue, Chicago, Ill.
"Clark Jewel" electric ranges, 7 kilowatts and less, 110 and 220 volts, catalog Nos. 1400, 1446, 1473, 1547.
In the installation of these devices it is considered desirable, from standpoint of safety to persons, that framework be permanently and securely grounded, a soldering lug being provided on each device for this purpose. The same protection for surrounding materials should be observed in installation of these devices as are applied to stoves of other types used commonly for cooking.
Listed August 10, 1917.

Fixtures.—The McCrosky Reamer Company, Incorporated, Meadville, Pa.
This device is an adjustable fixture for supporting an incandescent lamp. The stem is provided with universal joints and is adjustable in any direction.
Listed July 24, 1917.

Fixtures, Electric and Combination.—Montgomery Ward & Company, Chicago Avenue and Larrabee Street, Chicago, Ill.
Listed July 30, 1917.

Fixture Fittings.—Edward F. Caldwell & Company, Incorporated, 34 West Fifteenth Street, New York City, N. Y.
"Tizley Hook." Cylindrical support threaded for fixture stem and fitted with beveled plate attached to spring for drawing fixture tight to wall and keyed in position to prevent turning.
Listed August 10, 1917.

Ground Clamps.—Charles M. Rose Company, 15 East Seventeenth Street, New York City, N. Y.
"Masterpiece." Ground clamps for use with armored cable and four-inch rigid conduit or less.
Listed August 7, 1917.

Horns.—Russell Electric Company, Danbury, Conn.
"Russell," 220 volts or less, alternating cutout, catalog Nos. 400, 600, 7100.
Listed July 10, 1917.

Receptacles for Attachment Plugs, and Plugs. — The Bryant Electric Company, Bridgeport, Conn.
"Bryant" or "Perkins." Six amperes, 250 volts, 12 amperes, 125 volts, catalog Nos. 308-09.
Listed July 27, 1917.

Rectifiers.—Ellington Electric Company, Quincy, Ill.
Motor-generator type rectifiers for charging vehicle batteries, 220 volts or less, 2 kilowatts or less.
Listed July 19, 1917.

Resistance Appliances. — General Electric Company, Schenectady, N. Y.
Protective panel for drum controllers (for industrial service). Type CR-5070.
Panel for motor-starting rheostats. Type CR1301.
Listed July 20, 1917.

Rosettes, Fuseless. — The Bryant Electric Company, Bridgeport, Conn.
"Bryant or Perkins." Three amperes, 250 volts, catalog Nos. 505, 572-575 inclusive.
Listed July 31, 1917.

Sockets, Medium Base. — S. S. Kresge Company, Detroit, Mich.
"Kresge" metal shell.
Key, catalog Nos. K-1110, K-1150 to K-1152 inclusive.
Keyless, catalog Nos. K-1160 to K1163 inclusive.
Listed July 31, 1917.

Switches, Fixture.—General Electric Company, Schenectady, N. Y.
Adaptations of standard "G. E." pull-socket mechanisms.
"G. E." single-pole, 1 ampere, 250 volts, 3 amperes, 125 volts, catalog No. GE701.
Listed August 15, 1917.

Switches, Pendent. — The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.
"C-H Feed-Thru," catalog Nos. 7043, 7050.
Listed July 18, 1917.

Switches, Surface. — The Arrow Electric Company, Hartford, Conn.
"Arrow E." Single-pole, catalog Nos. 6104, 6105, 6110-13 inclusive, 6146, 6147, 6196-99 inclusive, 6248, 6249, 6262, 6263, 6270-79 inclusive, 6283, 6308-11 inclusive, 6355, 6356, 6386-89 inclusive.
Double-pole, catalog Nos. 6285, 6287, 6325-28 inclusive, 6357, 6358, 6640-43 inclusive.
Three-way, catalog Nos. 6124, 6125, 6138, 6139, 6333, 6334, 6344, 6345, 6359.
Two-circuit, catalog Nos. 6126, 6127, 6134-37 inclusive, 6148-51 inclusive, 6156-59 inclusive, 6164-67 inclusive, 6172-75 inclusive, 6180-83 inclusive, 6293, 6295, 6394-97 inclusive, 6426-29 inclusive, 6434-37 inclusive, 6452-55 inclusive, 6460-63 inclusive, 6468-71 inclusive, 6631-34 inclusive, 6646-49 inclusive.
Three-circuit, catalog Nos. 6192-95 inclusive, 6297, 6299, 6378-81 inclusive.
Heater switches, series, multiple and series-multiple, 3 amperes, 250 volts, 5 amperes, 125 volts, catalog No. 6130; 5 amperes, 250 volts, 10 amperes, 125 volts, catalog Nos. 6329, 6360, 6398, 6399, 6414, 6419, 6430, 6438, 6439, 6447-49 inclusive.
Lock attachments, catalog Nos. 6140, 6683, 6684.
Listed July 20, 1917.

Switches, Surface.—General Electric Company, Schenectady, N. Y.
Ceiling switches — adaptations of standard "G. E." pull mechanisms.
"G. E." Single-pole, 1 ampere, 250 volts, 3 amperes, 125 volts, catalog Nos. GE698-99.
Listed August 14, 1917.

Welding Machines. — Thomson Electric Welding Company, 84 State Street, Boston, Mass.
Electric welding machines used to effect union of pieces of metal by compression, after softening by heat produced electrically.
Thomson butt welders, 5 to 150 kilowatts, 110, 220 or 440 volts.
Listed July 2, 1917.

Personal and Biographical

V. G. CORKINS has been appointed superintendent of the Chehalis (Wash.) plant of North Coast Power Company, Portland, Ore.

LOUIS T. KLANDER has been appointed construction engineer for the Philadelphia Rapid Transit Company, succeeding W. C. Kerr, who joined the staff of Republic Railway & Light Company, New York City.

D. E. CROUSE has resigned as chief engineer of Auburn & Syracuse Electric Railroad, Auburn, N. Y., to accept a similar position with the Rochester, Syracuse & Eastern Railroad, with headquarters at Newark, N. J.

JAMES R. COCHRANE has been appointed master mechanic of Richmond Light & Railroad Company, New Brighton, N. Y., succeeding M. J. Brennan. Mr. Cochrane formerly was master mechanic of the Shore Line Electric Railway, Saybrook, Conn.

J. A. LIGHTHIPE, as electrical engineer for the Southern California Edison Company, Los Angeles, Cal., has given special attention to safety engineering features, and is said to have put into practice methods whereby the number of accidents has been greatly reduced.

GEORGE K. WEEKS has been elected vice-president of the National City Company of New York, and will be in charge of that company's business west of the Rocky Mountains, with offices at San Francisco. He was formerly president of the San Francisco-Oakland Terminal Railway, Oakland, Cal.

C. F. W. WETTERER, lately succeeded J. C. Woodsome as manager for the Tampa (Fla.) Electric Company. He was appointed to the position by the Stone & Webster Management Association, with which he has been connected since his graduation from Massachusetts Institute of Technology, in 1906.

C. COLBURN has resigned as general superintendent of the Norfolk and Berkley divisions of the Virginia Railway & Power Company, Richmond, Va. Mr. Colburn began in the employ of the company as a motorman in 1902, and advanced steadily to higher positions until in 1915, when he was made general superintendent.

O. B. COLDWELL, general superintendent of the Portland Railway, Light & Power Company, Portland, Ore., is chairman of the executive committee of the Northwest Electric Light & Power Association, and in that capacity is giving much time and effort in arranging for the annual convention of that association, at Spokane, September 12 to 15, inclusive. Mr. Coldwell is one of the past presidents of the association, and has contributed greatly to the large attendance of the former meetings and to their general success.

A. S. LINDSTROM has been appointed general manager of the Thordarson Electric Manufacturing Company, Chicago. Mr. Lindstrom was formerly connected with Western Electric Company. He then went to the Pacific Coast to construct a number of independent telephone plants and do general consulting engineering. When the Panama-Pacific International Exposition opened he accepted a position as assistant chief of the department of machinery exhibits, in Machinery Hall. Following the installation of these exhibits he became director of high-voltage research and was in charge of the exhibit of the Thordarson company on the Pacific Coast until August 1, 1917. Since that time the Thordarson company has increased its factory and office help by 20 per cent, added new machinery, to take care of increasing orders for regular lines, which have been manufactured for many years, also for power transformers.

HARRY REED, of Louisville, president of the Kentucky Utilities Company has been elected president of the United Gas & Electric Company, of New Albany and Jeffersonville, Ind., and of the New Albany Water Company, succeeding Chester P. Wilson, of Indianapolis. This means that the management of the New Albany and Jeffersonville companies, which are properties of the Interstate Public Service Company, will be transferred from Indianapolis to Louisville. Both the Interstate Public Service Company, of which Mr. Wilson is president, and the Kentucky Utilities Company are subsidiaries of the Middle West Utilities Company. Mr. Reed also was elected vice-president of the Louisville & Northern Railway & Light Company, and the Louisville & Southern Indiana Traction Company.

Obituary.

ERNEST HARLAN HAUGHTON, general manager of the Bryan-Marsh division of the National Lamp Works of General Electric Company, Chicago,

E. H. Haughton.

who, together with his wife, Mrs. Julia (nee Yeaman) Haughton, lost his life on Wednesday, August 22, when on an automobile tour through the Adirondacks, was a graduate of the University of Nebraska in the class of 1895. He started his business career as an inspector with the Underwriters' Electrical Testing Laboratories. Owing to some litigation which arose, this position was not of long duration. He then entered the field of salesmanship, in which he remained the rest of his life. For five years Mr. Haughton had sold rubber tires. September 1, 1901, he entered the incandescent lamp business, selling lamps at first in southern territory. On January 1, 1902, he resigned from the Morgan Lamp Company and joined the Bryan-Marsh Company, which he served in the capacity of salesman from that date until October 1, 1902, when he became manager of the Bryan-Marsh Company's Cincinnati branch. He continued in this position until January 1, 1904. On August 1, 1904, he became general manager of the company's main office at Chicago. Mr. Haughton, who was known to his friends in the electrical business as "Ernie," was the possessor of a strong, distinct personality. In his college days a baseball athlete (his cousin is Percy D. Haughton, the Harvard football coach), he never lost a certain strain of vigorous exuberance, at the same time he was one of the tenderest of men; his affection for his business associates was one of his noblest traits. Probably every one who has attended the summer conferences of the incandescent lamp manufacturers at Association Island, New York, will remember Mr. Haughton's reputation as a writer of songs that have done so much to establish a feeling of co-operation and good fellowship in the electrical manufacturing industry. He was a member of a number of engineering and civic organizations and took great pride in service to his fellow men. He was a prominent advocate of many of the extraordinary movements adopted by the National Lamp Works in behalf of employes and his interest in their welfare never abated. He was an honored and trusted executive of their savings association and a director of the trust fund created for the investment of these savings. Two children survive Mr. and Mrs. Haughton, Julia, aged 11, and Ernestine, aged 5. The funeral was held in Henderson, Ky., on Monday, August 25, and memorial services held at the East Cleveland (O.) Presbyterian Church.

ARTHUR KNEISEL, treasurer of the American Association of Engineers, died in Chicago on August 17, 1917. He was one of the original promoters of the Association and was secretary up to this year. As a writer of technical articles, he always stood for the principal of "elevating the engineering profession and receiving recognition for the engineer." Mr. Kneisel was born in Lexington, Ky., in 1880, and received his early education in the Lexington schools, later graduating from the University of Kentucky. He came to Chicago over 15 years ago and was engaged as a telephone engineer and patent attorney. At the time of his death, he was president of the Utilities Development & Sales Company.

Current Electrical News

WEEKLY RECORD OF CONSTRUCTION ACTIVITIES

EASTERN STATES.

CLAREMONT, N. H.—Claremont Power Company has completed the installation of a new transmission line from Claremont to Charlestown to carry 44,000 volts.

RUTLAND, VT.—Rutland Railway, Light & Power Company has completed the construction of a new high-tension line from Rutland to Castleton. A new substation for local service at Castleton has also been completed and operation of the system will soon be commenced.

FLORENCE, MASS.—Nonotuck Silk Company has commenced the erection of a two-story addition to its power plant, about 25x30 feet, for works operation.

NEW BEDFORD, MASS.—Union Street Railway Company will spend $1,000,000 in building power station to meet increasing demands upon generating capacity. The building, which will be erected upon the company's wharf, will be 80 by 115 feet, 70 feet high, of brick, with concrete chimney. It will have a 30-ton crane. Construction work and installation of equipment will be supervised by company.

NEW HAVEN, CONN.—Rapid progress is being made in the erection of the new power plant of the Connecticut Power Company and it is expected to have the station in full operation in from 30 to 60 days. The plant is designed to provide for an ultimate capacity of about 100,000 kilowatts. The J. G. White Engineering Corporation, 43 Exchange Place, New York, has handled the construction and installation.

NEW LONDON, CONN.—Connecticut Power Company has contracted to supply power to operate the Milford & Uxbridge Street Railway.

WATERBURY, CONN. — Husatonic Power Company, West Main Street, will build a two-story addition to its power plant on Freight Street, to cost about $25,000.

ALBANY, N. Y.—Northern New York Utilities, Inc., has asked for authority to issue $29,400 in common capital stock; $171,300 in preferred stock and $477,000 in bonds, under an existing mortgage. The proceeds are to be used for the completion of a transmission line from Natural Bridge to South Edwards, and for the reimbursement of the company's treasury.

BINGHAMTON, N. Y.—Binghamton Light, Heat & Power Company is planning for the immediate operation of its new power plant, recently completed. The installation consists of a 3,500-kilowatt turbo-generator. The company is considering the erection of a new substation. A new ornamental lighting system has been installed on the Court Street bridge, consisting of 250 watt lamps and 100 candlepower units.

BUFFALO, N. Y.—Buffalo General Electric Company plans the construction of a new transformer station on Gladstone Street.

BUFFALO, N. Y.—Buffalo City Hospital Commission will receive bids until Sept. 4 for lighting fixtures for the institution. Edward J. Meyer, president.

FULTON, N. Y.—Dilts Machine Company, First Street, manufacturer of paper machinery, will build a new hydro-electric power station for works operation, to cost about $15,000. Frank Dilts is president.

NEW YORK, N. Y.—Electric Bond & Share Company, 71 Broadway, has increased its capital from $1,600,000 to $2,000,000. The company operates a number of public utility companies in different sections of the country, and is affiliated with the General Electric Company.

BAYONNE, N. J.—City Commission has received a proposal from the Public Service Electric Company for the installation of a temporary arc light system on lower Broadway, instead of the proposed ornamental street-lighting system to be installed in accordance with contract with the city. The company agrees to build the ornamental system during the coming year, with total expenditure of $20,000 for street-lighting improvements.

BLOOMFIELD, N. J.—Council is considering a fund of $21,750 for street-lighting during the coming year.

DOVER, N. J.—New Jersey Power & Light Company is planning for closing down of the old city steam plant on North Sussex Street, which has been used during the construction of extensions to the new station on the outskirts of the city. The load will be carried by the new plant.

GLOUCESTER CITY, N. J.—Common Council has approved an appropriation of $12,000 for street-lighting during the coming year.

HADDONFIELD, N. J.—Borough officials are considering the installation of a new street-lighting system, replacing the present arc lamps with incandescent units.

LAKEWOOD, N. J.—Board of Public Utility Commissioners has granted the Lakewood & Coast Electric Company permission to issue securities for $20,500 for betterments, etc.

MOUNT HOLLY, N. J.—Board of Freeholders has denied the application of the Delaware & Atlantic Telegraph & Telephone Company for a fifty-year franchise on certain roads in the county.

NEWARK, N. J.—Committee on Public Buildings of the Common Council will receive bids until Sept. 4 for new lighting equipment and fixtures for the Newark City Hospital, Fairmont Avenue; also, for refrigerating and ice-making machinery for the institution. Thomas J. Lee, Jr., chairman.

NEWARK, N. J.—In its annual tax budget, the Common Council has made an appropriation of $220,000 for street-lighting.

NEWARK, N. J.—Hillside Township Committee has approved a fund of $3,600 for street-lighting.

PERTH AMBOY, N. J.—Committee on Streets of the Board of Aldermen will receive bids on Sept. 17 for the construction of a commercial lighting system in the business section, to be operated by the municipal electric plant. The work will include an underground conduit system on Smith and State Streets. Runyon & Carey, 843 Broad Street, Newark, are engineers.

PRINCETON, N. J.—Public Service Electric Company has commenced the installation of underground lines on Stockton Street to replace its overhead system. The company is also planning for a similar improvement on Nassau Street.

RAHWAY, N. J.—Common Council has authorized improvements and extensions in the fire alarm system.

TRENTON, N. J.—Francis, H. Bent, State Architect, State House, will receive bids until Sept. 11 for improvements and equipment at the boiler plant of the State Home for Boys, Jamesburg, including radial brick stack, pumping machinery, piping, etc.

TRENTON, N. J.—Public Service Corporation is planning for improvements and extensions in its local plant on Brunswick Avenue to cost about $200,000. Property has been purchased adjoining the station for the proposed expansion and preliminary work inaugurated.

WEST ORANGE, N. J.—Town Council has approved an appropriation of $25,500 for street-lighting.

ALTOONA, PA.—Penn Central Light & Power Company has received permission from the Public Service Commission to issue bonds for $78,000 for improvements and extensions.

CONEMAUGH, PA.—The Mountain Division of the Pennsylvania Railroad will be electrified from Altoona to Pittsburgh.

EDWARDSVILLE, PA.—A coal breaker will be installed by the D. L. & W. Company, same to be electrically equipped. Power will be supplied by Woodward Power Company.

ELIZABETHVILLE, PA.—Wiconisco Telephone Company is building a new line at Millersburg.

LANCASTER, PA.—Fidelity Electric Company has awarded a contract for the erection of a new building to L. V. Wright at a cost of about $30,000.

LANCASTER, PA.—Public Service Commission has granted the Edison Electric Company permission to issue bonds for $230,000 for expansion, betterments, etc.

MILLERSBURG, PA.—The Millersburg Electric Light, Heat & Power Company was authorized to construct an electric line across the river from a point in Halifax Borough to Juanita County by way of Clemson's Island.

MILLERSBURG, PA. — Millersburg Electric Company has received permission from the State Water Supply Commission to build a new transmission line from Halifax to New Buffalo, by way of Clemson's Island.

PENNBROOK, PA.—Fire recently destroyed the grain mill of S. A. Fishburn, including all electrical equipment. It is said that the plant will be rebuilt.

PHILADELPHIA, PA.—Department of Public Health & Charities will receive bids until Sept. 12 for the construction of a new one-story power plant at the institution, Thirty-fourth and Pine Streets. Philip H. Johnson, 110 South Broad Stret, is architect.

PHILADELPHIA, PA.—Pennsylvania Railroad has awarded a contract for the construction of a new one-story power plant at its works, Girard Point, to John N. Gill & Company, 1215 Filbert Street. With a new shop building the station will cost about $42,000.

PHILADELPHIA, PA.—Penn Chemical Company, Washington Avenue, erecting new power station for works operation. The plant will cost about $35,000.

PHILADELPHIA, PA.—Atlantic Refining Company will erect a new one-story power plant addition to its works at Thirty-sixth Street and Jackson Avenue, to cost about $22,000.

PHILADELPHIA, PA.—Philadelphia Suburban Gas & Electric Company has been granted permission by the Public Service Commission to issue bonds for $168,000 for proposed expansion.

PITTSBURGH, PA.—Mahoning & Shenango Railway & Light Company has been granted permission by the Public Service Commission to issue bonds for $500,000 for extensions. Headquarters of company are at Youngstown, O.

POTTSTOWN, PA.—Nagle Steel Company has commenced the installation of new electrical equipment at its Glasgow works.

READING, PA.—Reading Transit & Light Company, which now controls the Metropolitan-Edison Company and other utilities at Reading, Lebanon and Easton, will construct a 33,000-volt transmission line to connect West Reading plant with that at Lebanon, at a cost of about $30,000.

READING, PA.—Property owners at Penn Square, from Fourth to Sixth Streets, are perfecting plans for the installation of a new "white way" street-lighting system. The Metropolitan Electric Company has commenced the installation of an underground conduit system in this district and will furnish service for the new street-lights.

BALTIMORE, MD.—Baltimore Dry Dock & Shipbuilding Company has awarded contract for construction of a new one-story power plant, 70x90 feet, for works operation, to cost about $20,000.

BALTIMORE, MD.—United Railways & Electric Company is planning for an appropriation of $3,000,000 for extensions

and improvements during the next four years.

BALTIMORE, MD.—Goucher College is planning for the immediate construction of its proposed new power plant on St. Paul Street. Ellicott & Emmart, Union Trust Building, are architects.

WASHINGTON, D. C.—Potomac Electric Power Company is planning the construction of its proposed new power plant on Benning Road, N. E., to cost about $40,000.

NEWPORT NEWS, VA.—Newport News & Hampton Railway, Gas & Electric Company has increased its capital from $2,375,000 to $4,000,000 for extensions. J. N. Shannahan is general manager.

NORFOLK, VA.—Bureau of Yards & Docks, Navy Department, has awarded a contract for the construction of a new central power plant and distributing system at the local navy yard, to cost $800,000. The plant will be 100x200 feet.

RAPHINE, VA.—Old Providence Reformed Presbyterian Church is planning the installation of an electric generating station. C. D. Rowan, Greenville, is chairman.

ATLANTA, GA.—Georgia Railway Power Company has been granted authority to issue $2,500,000 collateral gold notes. The company will install a sixth power unit in its hydroelectric plant.

AUGUSTA, GA.—Augusta-Aiken Railway & Electric Corporation is contemplating construction of loop connecting its Monte Sano and Summerville lines. R. W. Stanford, general manager.

MACON, GA.—Home Electric Light & Power Company has increased its capital from $50,000 to $100,000 for extensions, etc.

PALMETTO, GA.—Palmetto Cotton Mills are planning for the installation of electric equipment at their plant.

NORTH CENTRAL STATES.

CLEVELAND, OHIO.—Domestic Electric Company has increased its capital stock from $50,000 to $100,000.

CLEVELAND, O.—Cleveland Electric Illuminating Company has awarded contract to the Turner Construction Company, 244 Madison Avenue, New York, for reinforced concrete work in connection with the construction of its new power plant. The structure will be about 120x300 feet.

SANDUSKY, O.—Sandusky Gas & Electric Company is planning for the construction of a new transmission line to connect with the system of the Lake Shore Electric Company.

RICHMOND, IND.—Richmond Electric Company has increased its capital stock from $3,000 to $13,000.

MATTOON, ILL.—Central Illinois Public Service Company, a subsidiary of the Middle West Utilities Company, has acquired the Southern Illinois Railway & Power Company. This is a step toward linking up of a direct trolley line through the coal regions of Illinois into St. Louis.

RIDGE FARM, ILL.—A company is being organized to build an electric line between Clinton and Ridge Farm. For particulars address John W. Foster, Ridge Farm.

IRON MOUNTAIN, MICH.—Michigan State Telephone Company recently received $19,000 worth of copper wire, several carloads of cross-arms and cedar poles, to be used in improving service in this city and vicinity. Improvements to cost over $60,000 are under supervision of Lyman Green. New all-copper lines are being constructed between Iron Mountain and Powers, Iron Mountain and Crystal Falls and Iron Mountain and Marquette range.

NASHVILLE, MICH.—Town is considering the question of boulevard lighting.

WHITEHALL, MICH.—White River Power & Lighting Company has been organized with capital of $100,000, of which $64,000 has been paid in. The officers are: John O. Reed, president; F. H. Speese, vice-president; C. G. Pitkin, secretary, and G. E. Covell, treasurer.

ASHLAND, WIS.—Plans are being considered by the Wisconsin Telephone Company for the extension of its service.

BEAVER DAM, WIS.—It is proposed that the city buy and improve the local electric light plant.

MADISON, WIS.—Wisconsin Telephone Company will lay conduits on University Avenue, from Charter to Lathrop Streets, and on Brooks Street, from University Avenue to West Dayton Street. Work will be under the supervision of City Engineer Parker and Street Superintendent Sullivan.

MARINETTE, WIS.—Brown Mitcheson Company is building large addition to electric plant.

MARINETTE, WIS.—Marinette & Menominee Light & Traction Company has had plans prepared for a transformer station. J. B. Schickel, manager, Mission Point Building.

SHAWANO, WIS.—Bids will be received until Sept. 7 for hydroelectric power plant addition. Address Electric Light & Waterworks Commissioner.

WAUWATOSA, WIS.—A central power plant will be built to furnish light and power for all the county institutions. F. C. Phelps, County Clerk, Milwaukee.

DONNELLY, MINN.—An election will be held Sept. 4 to decide the question of issuing $14,000 in bonds for municipal electric light and power plant, also overhead pole and wire system.

RICE, MINN.—Town has voted to issue $8,000 in bonds to build a transmission line from Little Falls to Royalton; and Rice will then obtain current indirectly from the Little Falls Water Power Company, through the Royalton supply. Earl Jackson, consulting engineer, of St. Paul, is to plan the line.

DES MOINES, IA.—It is proposed to install 250 additional electroliers in the metropolitan lighting district.

DUBUQUE, IA.—Eastern Iowa Electric Company has petitioned for franchise to build transmission lines from Dubuque to Dyersville, Holy Cross, Luxemburg and New Wine.

KANSAS CITY, MO.—The building of a new municipal electric lighting plant is being considered by the council. The project involves issuance of bonds amounting to $1,000,000.

SAWYER, KANS.—City is considering installation of an electric light plant.

AVOCA, NEB.—A bond issue of $5,000 for an electric lighting plant was authorized by the voters.

RED CLOUD, NEB.—Lincoln Telephone & Telegraph Company is completing plans for spending a large sum of money in Webster County for improvements, overhauling, putting in new lines, etc. George Warren is local manager.

PIERRE, S. D.—W. H. Finley, chief engineer of the Chicago & Northwestern Railway, has investigated the possibilities of a power site at Little Bend, on the Missouri River. He states the physical features are adapted to the construction of water power by means of a diversion dam and canal, of 40 feet head. He estimates the cost of hydroelectric development on a safe and permanent basis would be $20,000,000.

DUNN CENTER, N. D.—Dunn Center municipal electric lighting plant has been taken over by the Dunn Center Equity Elevator Company, which will operate plant, using excess power produced at its elevator.

STANLEY, N. D.—R. F. Wherland, manager of the Stanley electric light plant, has announced that it will erect a modern power plant and office building.

DATES AHEAD.

Association of Iron and Steel Electrical Engineers, Eleventh annual convention, Philadelphia, Pa., Bellevue-Stratford Hotel, September 10 to 14. Secretary, J. F. Kelly, National Tube Company, McKeesport, Pa.

International Association of Municipal Electricians. Annual convention, Niagara Falls, N. Y., September 11 to 14. Secretary, Clarence R. George, Houston, Texas.

Northwest Section, National Electric Light Association. Annual convention, Spokane, Wash., September 12 to 15. Secretary, J. F. Farquhar, Washington Water Power Company, Spokane, Wash.

Colorado Electric Light, Power and Railway Association. Annual convention, Colorado Springs, Colo., September 20-22. Secretary, T. F. Kennedy, 900 15th Street, Denver, Colo.

American Electrochemical Society. Annual convention, Pittsburgh, Pa., October 3 to 6. Secretary, Prof. J. W. Richards, Lehigh University, South Bethlehem, Pa.

National Electrical Contractors' Association of the United States. Annual convention, New Orleans, La., October 10 to 13. Secretary, H. C. Brown, Utica, N. Y.

SOUTH CENTRAL STATES.

UNIONTOWN, KY.—Uniontown Telephone Company is planning for extensions and improvements in its system. S. W. Clements is secretary.

JOHNSON CITY, TENN.—Beaver Creek Coal Company is planning for the installation of electric machinery at its properties near Alphoretta, Ky. The installation will consist of electric operating equipment, electric cutting machines, electric locomotive, and other apparatus. S. R. Jennings, president.

NASHVILLE, TENN.—Fick University is planning for the construction of a new power house.

OAKDALE, TENN.—Oakdale Hosiery Mill is planning for the installation of new electric equipment at its proposed works. S. N. Oakley, president.

FORT SMITH, ARK.—Fort Smith Light & Traction Company is planning for the construction of a new electric generating plant with capacity of about 5,000 horsepower. The station will be erected on the Arkansas River in connection with its present plant. A new transmission line is planned to Alma and vicinity, to furnish service to the Citizens' Electric Company for local distribution.

RUSSELLVILLE, ARK.—Arkansas Light & Power Company is reported to be planning for the installation of a new steam turbo-generator at its plant.

HENRYETTA, OKLA.—Henryetta Dewar Kusa Traction Company has a franchise for an electric line connecting Dewar, Henryetta and Kusa. Bonds for the construction of the line have been voted and more than two miles of rails are here. J. J. Harrison is general manager of the company.

DALLAS, TEX.—Texas Traction Company has been granted permit for interurban express building to cost $20,000, to be erected at Young and Jefferson Streets. The building will be 200 feet long. R. B. Stichter is general manager.

DENTON, TEX.—Dallas Northwestern Traction Company has been granted franchise to build an interurban line through Denton County, paralleling the M., K. & T. road from Dallas to Denton, thence to Krum and Slidell. Work must begin within 90 days.

HOUSTON, TEX.—Houston Electric Company has been granted franchise to build extension to Camp Logan. David Daly, manager.

WESTERN STATES.

AJO, ARIZ.—New Cornelia Copper Company, which has placed in operation its 5,000-ton copper-leaching plant, with electrolytic precipitation, is having plans drawn for a smelting plant of 2,000 tons daily capacity, estimated to cost $1,500,000; and an oil-flotation plant of 5,000 tons capacity. These installations will require extensive electrical equipment, including motor drives for flotation plant.

PHOENIX, ARIZ.—W. W. Shenk, Globe, has applied to the Corporation Commission for authority to organize a company having plans for building a hydroelectric plant on the Colorado River to supply power for electric railways.

WALLACE, IDAHO.—Yukon Gold Company, which has a dredge nearly ready for operation on Pritchard Creek, in Coeur d'Alene district, may construct two other dredges for the same locality. These boats require electrical equipment and an electric power line is being extended to this field of operations.

SEATTLE, WASH.—Public Utilities Committee of the City Council recommends the appropriation of $10,000 for purchase of pipe needed for sluicing operations to seal the wall behind the dam at the Cedar River power station.

SEDRO WOOLLEY, WASH.—Warrack Construction Company, Arcade building, Seattle, was awarded contract by the State Board of Control for construction of the power house at the state insane asylum at $24,200. Bids for boilers were rejected as too high, and new bids will be called. George W. Lawton, Alaska building, Seattle, is the architect.

PROSSER, WASH.—D. L. Lewis, manager Pacific Power & Light Company, asked for a 50-year franchise for furnishing current for street and residence lighting and power purchases.

TACOMA, WASH.—Ordinance has been passed by the City Council to issue util-

ity bonds for constructing and equipping a municipal street car line to the Todd ship yards, amounting to $160,000, and repealing an ordinance authorizing a former bond issue of $35,000. Nickolas Lawson, former Commission of Light and Water, has the contract for constructing the line.

TACOMA, WASH.—The question of issuing $3,000,000 in bonds to pay for and develop the Lake Cushman power site will be submitted to a vote along with other propositions for raising revenue. The City Council recently took an option to purchase that site.

ANYOX, B. C., CANADA.—Granby Consolidated Copper Company, which lately acquired a coal property, will develop same, and equip for coke production, and will build a by-products plant.

GREENWOOD, B. C., CANADA.—Canada Copper Company is preparing to erect and equip a concentrating plant of 3,000 tons daily capacity, at its mines, near Penticton, B. C. A hydroelectric power plant will be built to supply power for air-compressors, shop tools and mill machinery. A railroad branch will be built from Princeton to the mines, 12 miles long. Estimated costs of contemplated improvements reach $2,000,000.

MARSHFIELD, ORE.—Charles Crane is surveying his Golden Falls property with a view to converting it into a hydroelectric plant.

FRESNO, CAL.—Pacific Gas & Electric Company will erect a gas plant, at an expenditure of nearly $500,000. The company will dismantle its present plant. The new plant, which will cover seven and one-half acres, will have a 15,000-barrel oil tank, two Jones' improved gas sets, 450-horsepower boiler and other equipment. The site adjoins the Associated Pipe Line Company's plant.

SAN FRANCISCO, CAL.—Pacific Gas & Electric Company is planning the development of 180,000 horsepower at the recently acquired Pitt River power site, in the northern part of California. The company now generates 156,000 horsepower at its eleven hydroelectric plants. Engineers are working on excavating features. The entire work will require five years; the plan is to spend $300,000 in the first year's work, $1,500,000 in the second, $2,000,000 in the third, $7,000,000 in the fourth, and $6,700,000 in the fifth year, making the total cost $17,500,000.

PROPOSALS

MOTOR GENERATOR SETS AND ACCESSORIES—Sealed bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until September 4, for 400-kilowatt motor generator sets and accessories at the navy yards, Philadelphia, Pa.; Boston, Mass.; Mare Island, Cal., and the naval base, San Pedro, Cal. Specification No. 2530 may be obtained on application to the Bureau or to the commandant of the navy yards named. Address F. R. Harris, chief of bureau.

ELECTRICAL DISTRIBUTION — Bureau of Yards and Docks, Navy Department, Washington, D. C., will receive bids until Sept. 10, for material and installation of tunnels, manholes, pipings and fittings for hydraulic and electrical distributing system in navy yard at Norfolk, Va. Specifications 2504.

POWER HOUSE—Wilmer Krusen, director of Department of Public Health and Charities, Philadelphia, Pa., will receive bids, until Sept. 12, for construction of power-house for Philadelphia General Hospital, 34th and Pine Streets. Philip H. Johnson, architect, Land Title building, Philadelphia.

ELECTRIC POWER EQUIPMENT—N. J. Griffin, city clerk, Burlingame, Kans., will receive bids until Sept. 3 for a 100-horsepower semi-Diesel engine and a 60-kilovolt-ampere electric generator for installation as additional unit in waterworks plant. Estimated cost, $11,400. Black & Veatch, engineers, Kansas City, Mo.

Electrical Patents Issued August 14, 1917

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,236,395. Method and Apparatus for Extracting Zinc. E. S. Berglund, Trollhattan, Sweden. Electrothermic process.

1,236,404. Connector for Electric Leads. P. Clerget, assignor to Society Clerget Blin & Cie., Levallois-Perret, France. Structural details.

1,236,423. Lamp With Pivoted Reflector. C. E. Godley, assignor to Edmunds & Jones Corp., Detroit, Mich. Headlight structure.

1,236,433. Display or Advertising Mechanism. H. J. Herberts, assignor to Herberts Engineering Co., Inc., New York, N. Y. Magnetically rotated structure.

1,236,434. Signaling System. J. F. D. Hoge, assignor to American District Telegraph Co., Jersey City, N. J. Call box system.

1,236,438. Process of and Apparatus for Densified Electrodeposition. N. Huggins, assignor to Copper Products Co. Deposit is made and compressed in a conducting mold blank walled with insulation.

1,236,440. Electric Heating-Pad for Carbureters, etc. R. H. Humitsch, Cleveland, Ohio. Comprises a pad of insulated heater cones with an outer layer of asbestos.

1,236,441. Automatic Traffic-Signal. F. J. Husbands, Los Angeles, Cal. Arrangement of electro-magnetically operated semaphores.

1,236,448. Electrical Fuse. T. W. Kirkman, New York, N. Y. Structure of enclosed fuse.

1,236,480. Face-Plate for Electrical Wall Receptacles. J. G. Peterson, assignor to Manhattan Electrical Supply Co., Jersey City, N. J. Structural details.

1,236,485. Safety-Limit Switch. F. A. Rundle, Harvey, Ill. Details of operating means.

1,236,481. Electrical Testing Set. B. H. Skinner, assignor to Western Electric Co., New York, N. Y. Arrangement of connectors, resistances and ammeter for testing telephone circuits.

1,236,492. Message-Register Test Set. B. H. Skinner, assignor to Western Electric Co., New York, N. Y. For testing message registers of telephone circuits.

1,236,520 and 1,236,521. Electric Switch. H. E. White, assignor to Crocker-Wheeler Co., Ampere, N. J. First patent: Details of contact elements. Second patent: Details of lever switch having off, starting and running positions.

1,236,523. Contact-Point. J. A. Williams, Cleveland, Ohio. Composed of tungsten brazed to base by a coating covering the base.

1,236,526. Automobile Warning Device. B. Zabel, Edgewood Borough, Pa. Signal circuit is jointly closed by running gear and brake mechanism with lock controlled means for preventing operation of the signal.

1,236,529. Electrically-Controlled Centrifugal Extractor. F. Balzer, assignor to Troy Laundry Machinery Co., Ltd., Chicago, Ill. Control of electric driving motor and solenoid brake.

1,236,530. Safety Mechanism for Electrically Operated Extractors. F. Balzer, assignor to Troy Laundry Machinery Co., Ltd. Motor starting switch cannot be operated when extractor cover is open.

1,236,541. Signaling Apparatus. J. L. Cayer, F. E. McDonald and J. W. Eskholme, assignors to Cayer Signal Co., Chicago, Ill. Automobile direction indicator.

1,236,543. Circuit-Controlling Device. T. E. Clark and E. A. Lueky, Detroit, Mich. Structure of circuit breaker.

1,236,563. Excess Voltage Protecting Device for Electric Lines. T. A. F. Holmgren, Trollhattan and K. A. Lindstrom, Stocksund, Sweden. Several grounded conductors are strung along a working line so that corona effect takes place at their surfaces when voltage on working line is excessive.

1,236,566. Signal for Use With Vehicles. C. S. Jameson, Swampscott, Mass., assignor one-half to H. L. Watson, Lynn, Mass. Structure of selective switch.

1,236,567. Telephone Attachment. H. V. Jobe, Roll, Okla. Details of switch structure.

Telephony. M. L. Johnson, assignor to Frank B. Cook Co., Chicago, Ill. Semi-automatic exchange system.

1,236,575. Telegraphy. I. Kitsee, assignor to American Telephone & Telegraph Co., New York, N. Y. Quadruplex system.

1,236,576. Telegraphic Transmission. I. Kitsee, assignor to American Telephone & Telegraph Co. Rotary switching mechanism alternately connects two condensers to discharge into the line and connect them for charging when disconnected from line.

1,236,584. Lightning-Arrester. R. H. Manson, assignor to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Insulating disk between line and ground plates is rotatable to keep them clean; for telephone lines.

1,236,590. Timer for Ignition Apparatus. J. L. Milton, assignor to Motor Ignition & Devices Co. Structural details.

1,236,592. Electric Sign. A. Morgan, Independence, Mo. Structure of selective lamp controlling switch mechanism.

1,236,595. Protective System for Electrical Transmission Lines. L. C. Nicholson, Buffalo, N. Y. For extinguishing arcs on high tension, polyphase systems.

1,236,613. Telephone System and the Like. J. Skinderviken, assignor to S-R Electric Co., Chicago, Ill. Multiple party line.

1,236,622. Method of and Means for Preventing Conflagrations. H. F. Taylor, assignor to J. Mesmer, Los Angeles, Cal. Electrically heated, franzible vessel contains substance converted into extinguishing vapor by heat.

1,236,623. Fluid Heating and Pressure Generation. W. B. Thomson, Chicago, Ill. Comprises electric ignition arrangements for combustible charge in the fluid chamber.

1,236,624. Train Control System. G. P. Thuber, Pittsburgh, Pa. Arrangement of circuit breakers for controlling the train control and propulsion circuits.

1,236,625. Electric Signal Device. J. Tomko and C. W. Oppenlander, Cleveland, O. Street traffic control post with solenoid operated semaphore arms.

1,236,630. Electric Regulator. W. A. Turbayne, assignor to U. S. Light & Heat Corp., Niagara Falls, N. Y. Automatic resistance regulation for voltage of car lighting system.

1,236,642. Electric Heating Device. T. Abtmeyer and F. Thornton, assignors to Westinghouse Electric & Mfg. Co. A pivoted heater element is connected and disconnected as it is moved into and out of heating relation to a receptacle.

1,236,647. Annunciator. G. Alt., Evansville, Ind. Hand implement with several lamps behind a numbered plate, with push buttons in the handle for selectively operating the lamps.

1,236,649. Dead Beat Balanced Electrical Transmitter. E. H. Amet, Redondo Beach, Cal. Structure of variable resistance device of microphone.

1,236,657. Circuit Controller for Portable Electric Lights. W. Bauer, assignor to National Carbon Company, New York, N. Y. Switch in battery light simulating a candle.

1,236,672. Storage Battery Grid and Plate and Process of Making Same. R. N. Chamberlain, assignor to Gould Storage Battery Co. Has separated parallel members carrying pockets for the active material.

1,236,673. Storage Battery. R. N. Chamberlain, assignor to Gould Storage Battery Co. Cooling air is released in the electrolyte from a perforated coil.

1,236,674. Circuit-Interrupter. L. W. Chubb, assignor to Westinghouse Electric & Mfg. Co. Electrolytic arresters are connected across circuit breaker after it has opened.

1,236,675. Ventilating Means for Reactance-Coils. L. W. Chubb, assignor to Westinghouse Electric & Mfg. Co. Polyphase coils are arranged to operate a squirrel cage rotor driving a fan.

1,236,765. Power Actuated System of

Switch and Signal Control. G. B. Gray, Pittsburgh, Pa. Signal circuit is interrupted on application of power to operate railway track switch.

1,236,707. **Direction Indicator for Vehicles.** A. B. Gustafson, Duluth, Minn. Arrangement of solenoid operated lights.

1,236,711. **Control System.** F. G. Hickling, assignor to Westinghouse Electric & Mfg. Co. Provision for dynamic braking in electro-pneumatic train control system.

1,236,716. **Oscillating Phase Advancer.** G. Kapp, assignor to Westinghouse Electric & Mfg. Co. Alternating current connected to armature and direct current field cause armature to oscillate and alternating flux is superposed on field whereby the oscillation is greater than the pole pitch in one direction.

1,236,725. **System of Distribution.** W. O. Lum, assignor to Westinghouse Electric & Mfg. Co. Mechanically connected generators and mechanically connected motors are connected in a circuit to operate as a system at the voltage of a single generator.

1,236,726. **Motor-Control System.** W. O. Lum, assignor to Westinghouse Electric & Mfg. Co. For controlling railway motors.

1,236,732. **Electric Generator.** C. T. Mason, assignor to Splitdorf Electrical Co., Newark, N. J. Ignition magneto.

1,236,742. **Control System.** H. T. Morris, assignor to Westinghouse Electric & Mfg. Co. For train control on single-phase trolley system.

1,236,754. **Outlet-Box for Electric Conductors.** W. I. Patterson, Pittsburgh, Pa. Structure of floor outlet.

1,236,760. **Braking System.** C. Renshaw, assignor to Westinghouse Electric & Mfg. Co. Modification of 1,236,711.

1,236,765. **Connector.** B. P. Rowe, assignor to Westinghouse Electric & Mfg. Co. A three-way connector of flattened tubes.

1,236,722. **Rheostat.** M. L. Severy, Arlington Heights, Mass., and G. B. Sinclair, Georgetown, Me. Structure of box and resistance plates.

1,236,774 and 1,236,775. **Control System.** F. H. Shepard, assignor to Westinghouse Electric & Mfg. Co. Three-phase railway systems.

1,236,778 and 1,236,780. **Control System.** K. A. Simmon, assignor to Westinghouse Electric & Mfg. Co. Three-phase railway systems.

1,236,779. **Braking System.** K. A. Simmon, assignor to Westinghouse Electric & Mfg. Co. Modification of No. 1,236,711.

1,236,786. **Electrical Measuring Instrument.** H. B. Taylor, assignor to Westinghouse Electric & Mfg. Co. Pivoted armature is jointly actuated by magnetizable member surrounding conductor in which current is to be measured and permanent magnet at right angles thereto.

1,236,792. **X-Ray Apparatus.** J. B. Wantz, assignor to Victor Electric Corp., Chicago, Ill. For operating a tube of the type having a heating element.

1,236,803. **Engine-starting Mechanism.** A. F. Williams, assignor to North East Electric Co., Rochester, N. Y. Mounting and gearing of dynamo electric machine.

1,236,809. **Dimmer for Auto-Headlights.** F. G. Withrow and J. P. Weeks, Grand Rapids, Mich. Structure of resistance varying device.

1,236,796. **Current-Regulator for Automobile Light Circuits.** A. Wehmeir, assignor to Fore Electrical Mfg. Co., St. Louis, Mo. Laminated core structure.

1,236,830. **Automobile-Signal.** W. A. Falck and F. W. Falck, assignor to L. G. Fixen, Chicago, Ill. Electro-magnetically operated direction indicator.

1,236,858. **Telephone-Exchange System.** T. G. Martin, assignor to Automatic Electric Co., Chicago, Ill. Has special arrangement of service meter.

1,236,859. **Automatic Telephone System.** T. G. Martin, assignor to Automatic Electric Co. Special arrangements for connecting subscribers' lines with trunks.

1,236,862. **Sign.** M. S. Neal, assignor to E. G. Trimble and M. S. Neal, Kansas City, Mo. Arrangement for illuminating bill-boards.

1,236,876. **Telephone Attachment.** J. Rock & G. Sinkovic, New York, N. Y. Coin-controlled mechanism.

1,236,886. **Insulator for Telegraph and Telephone Wires.** A. C. Sorensen, Webster, N. D. Has off-set, insulating rollers tending to grip the wire.

1,236,897. **Railway Signaling System.** A. A. Armstrong, Watertown, S. D., and G. M. Rives, Leavenworth, Kans. Block system.

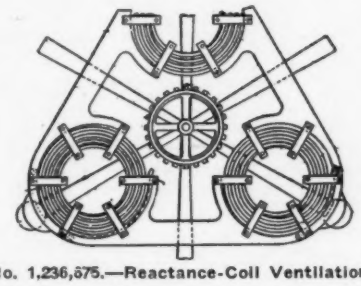
1,236,905. **Trolley-Wheel Guard.** N. Brown and U. Trudeau, Manchester, N. H. Structural details.

1,236,916. **Electric Regulation.** J. L. Creveling, assignor to Safety Car Heating & Lighting Co. Car lighting system.

1,236,931. **Sympathetic Governor for Electric-Power Distribution.** L. S. Henley, Lebanon and F. R. Keller, Manheim township, Lancaster county, Pa. For unloading air compressor according to power required by main unit operated from main source.

1,236,935. **Spark-Plug.** J. M. Hoffman, Brooklyn, N. Y. Structural details.

1,236,941. **Electric Ignition Apparatus.** E. S. Huff, assignor to Huff Laboratories,



No. 1,236,575.—Reactance-Coil Ventilation.

Inc., Detroit, Mich. Arrangement of circuits for internal combustion.

1,236,965. **Magnetic Clutch for Bobbins.** A. K. Miller, Worcester, Mass. Structural details.

1,236,976. **Indication-Transmitting Apparatus.** J. Perepelkin, Petrograd, Russia. Indicator is operated by special electromagnetic motor.

1,236,980. **Elevator-Door Control.** H. C. Randall, San Francisco, Cal. Special means for controlling motor according to condition of door.

1,236,989. **Electrical Make-and-Break Device.** E. T. Shaw, assignor to Pittsfield Spark Coil Co., Pittsfield, Mass. Structure of ignition timer.

1,237,033. **Arc-Lamp.** C. A. B. Halvorson, assignor to General Electric Co. Details of adjustable holder for non-consuming electrode.

1,237,015. **Electrical Condenser and Process of Making Same.** W. C. Brinton, Jr., assignor to Philips-Brinton Co., Kennett Square, Pa. Structural details of encased condenser.

1,237,080. **Electric-Motor Starter.** T. A. Melville, Fargo, N. D. Details of starting box rheostat.

1,237,105. **Warning-Signal.** F. Scognamillo, New York, N. Y. Details of motor operated horn.

1,237,112. **Portable Electric Light.** G. A. Soehnlein, Brooklyn, N. Y. Flash light structure.

1,237,113. **Ignition Cut-out and Transmission-Lock.** L. H. Sparks, assignor to J. I. Miller, Lakewood, N. J. Details

No. 1,237,187.—Cord Wedge for Sockets.

of circuit closer time controlled by clock mechanism.

1,237,123. **Electric-Light Regulator.** L. Sykes, assignor to Dudio Mfg. Co., Fort Wayne, Ind. Variable resistance device in lamp socket.

1,237,133. **Indicator System.** E. H. Wildasin, Wilkinsburg, Pa. Structure of circuit closer.

1,237,172. **Starting and Ignition Machine.** F. Conrad, assignor to Westinghouse Electric & Mfg. Co. Winding of machine to operate as a motor or as compound generator.

1,237,181. **Reciprocating Electric Motor or Engine.** E. I. Dodds, Central Valley, N. Y. Produces also rotation of the tool.

1,237,187. **Holder for Incandescent Electric Lamps.** G. E. Farrar, Perth, Western Australia, Australia. Special means for securing cords in socket to support it.

Patents Expired.

The following United States electrical patents expired on August 28, 1917:

656,635 and 656,636. Electric-motor Suspension. G. Gibbs, Philadelphia, Pa.

656,647. Lamp-shade Holder. A. E. Kearsley and H. C. Bowman, Manchester, England.

656,650. System of Electrical Distribution. A. D. Lunt, Schenectady, N. Y.

656,652. Carbon Brush. W. A. Markey, Saginaw, Mich.

656,672. Animal-releasing Device. F. A. Sprenger, Chicago, Ill.

656,680. System of Electrical Distribution. E. Thomson, Swampscott, Mass.

656,681. Circuit-breaker. E. Thomson.

656,688. Locking Coat Hook. J. C. Backus, Smethport, Pa.

656,700. Battery Box. L. W. Pullen, Camden, N. J.

656,703. Telephone System. F. G. Rugh, Briar Bluff, Ill.

656,716. Fluid-operated Electric Switch. C. A. Eck, Newark, N. J.

656,744. Device for Lighting Lamps by Electricity. S. M. Meyer, New York, N. Y.

656,762. Apparatus for Taking and Reproducing Animated Scenes and Sounds. A. Baron, Asnieres, France.

656,780. Lightning Arrester. W. E. Athearn, New York, N. Y.

656,790. Trolley. M. T. Schaffer, Bethlehem, Pa.

656,796. Signal-receiving Relay. G. K. Thompson, Malden, and E. C. Robes, Medford, Mass.

656,806. Alternating-current Generator. C. S. Bradley, Avon, N. Y.

656,808. Lock. H. G. Carleton, New York, N. Y.

656,821. Means for Controlling Energy Delivered to Electrical Translating Devices. H. W. Leonard, New York, N. Y.

656,828. Telautographic Apparatus. F. Ritchie, London, England.

656,832. Telegraphy. H. D. Bartholomew, Newark, Ohio.

656,840. Protector for Electric Lamps. F. B. Garretson, Worcester, Mass.

656,870. Electric Switch. R. H. Wappler, New York, N. Y.

656,882. Charging Stand and Contact for Storage Batteries. G. H. Condict, New York, N. Y.

656,907. Telephone Signaling Appliance for Party Telephone Lines. J. Steiner and W. H. Tuck, New York, N. Y.

656,923. Cable Hanger. C. E. Beard, Columbiana, Ohio.

656,930. Electric Furnace. W. Borchers, Aixla-Chapelle, Germany.

656,940. Engraving Machine. C. Chevalier, New York, N. Y.

656,957. Electric Signaling Apparatus. E. B. Ellicott and L. E. Oehring, Chicago, Ill.

656,961. Means for Securing Pole Pieces. H. Geisenhöner, Schnectady, N. Y.

656,972. Electric Motor. E. A. Henry, Crestline, Kan.

656,977. Electric Lamp for Miners' Use. L. Horwitz, Berlin, Germany.

656,982. Electrolytically Treating Scrap Tin. E. D. Kendall, New York, N. Y.

656,996. Supervisory Signal for Telephone Switchboards. F. R. McBerty, Evanston, Ill.

656,997. Signal for Telephone Trunk Lines. F. R. McBerty, Evanston, Ill.

657,012. Apparatus for Electrolysis. P. Schoon-Wildegg, Switzerland.

657,020. Portable Electric Lamp. F. W. Brooks, Washington, D. C.

657,032. Apparatus for Electrolyzing Ores. A. M. Rouse, Denver, Colo.

657,046. Multiple-motor System for Automobiles. J. Trier, Chicago, Ill.

Financial News and Comment

The United Railways and Electric Company, Baltimore, proposes the issuance of 6 per cent gold notes in the amount of $3,000,000, to be sold at 97½ and accrued interest. Proceeds of their sale is for making extensions, improvements and new equipment, including the purchase of new cars. Alex. Brown & Sons are concerned in financing referred to.

Electric Bond & Share Company's stockholders have authorized an increase in the capital stock from $16,000,000 to $20,000,000.

Officials of the United Railroads of San Francisco are negotiating for the sale of their street car system to the city. This move was brought about by a strike of car men. Plan is for the city to pay $50,000 on the property, take over its operation, then have its valuation fixed by the State Railroad Commission.

Reports of Earnings.

VIRGINIA RAILWAY & POWER CO.

	1917	1916
July gross	$ 561,752	$ 497,406
Net after expenses	277,357	262,303
Total income	286,891	270,644
Surplus after charges	129,541	123,085

WESTERN STATES GAS & ELECTRIC CO.

	1917	1916
July gross	$ 109,869	$ 98,081
Net after expenses	52,066	47,046
12 months' gross	1,320,996	1,215,870
Net after expenses	622,268	582,101

DETROIT EDISON CO.

	1917	1916
July gross	$ 877,283	$ 705,667
Net after taxes	214,047	220,704
Surplus after charges	127,910	133,991
7 months' gross	6,874,787	5,555,927
Net after taxes	2,182,422	2,098,780
Surplus after charges	1,588,228	1,466,036

LEHIGH VALLEY TRANSIT.

	1917	1916
July gross	$ 268,711	$ 229,722
Net	101,118	101,243
Surplus after charges	52,150	52,303
8 months' gross	1,821,054	1,582,268
Net	639,528	667,508
Surplus after charges	135,916	158,317

OKLAHOMA GAS & ELECTRIC CO.

Earnings of the unified Oklahoma Gas & Electric Co. for twelve months to June 30 are as follows:

	1917	1916
12 months' gross	$2,447,997	$2,170,422
Net after taxes	876,637	796,772
Surplus after charges	500,342	*.....

*Not given.

ALABAMA POWER COMPANY.

	1917.	1916.
July gross	$ 174,952	$ 120,97?
Net after taxes	103,551	72,926
Twelve months gross	1,832,122	1,294,460
Net after taxes	1,193,362	796,869

PHILADELPHIA COMPANY.

(Street Railway Department.)

	1917.	1916.
July gross	$1,236,707	$1,173,889
Net after taxes	398,773	362,398
Four months gross	4,856,047	4,563,776
Net after taxes	1,461,100	1,360,549

AMERICAN PUBLIC UTILITIES.

Reports earnings for the year ended June 30 as follows:

	1917.	1916.	1915.
Gross	$3,819,821	$3,309,586	$2,319,595
Net after tax	1,668,819	1,466,785	980,879
Other income	100,354	81,744	45,303
Total income	1,769,174	1,548,528	1,026,182
Other exp.	80,765	39,437	51,486
Net income	1,688,409	1,509,092	974,697
Surplus after charges	470,938	395,073	375,387
Balance after pfd. divs.	215,041	160,233	140,547

COPPER MARKET.

According to an official of a copper-producing company who is conversant with the situation, the Federal Trade Commission which has been investigating copper costs is about to make a favorable report, advising the payment of 25 cents a pound flat covering the 60,000,000-pound lot recently purchased by the Government. He adds that this price is also expected to apply on all future copper purchases for Government account.

It is understood the President may appoint a copper administrator, who will have charge of copper purchases for the United States and the Allies. Eugene V. Meyer, Jr., formerly connected with the Council of National Defense, is mentioned in connection with such appointment.

The serious curtailment of copper production in several states may so affect the supply as to create a shortage later in the year. Labor troubles in Montana and Arizona is the chief cause of a decrease in copper production; but there is also a decrease in other states, due principally to the uncertainty as to the price of copper, especially where custom smelters hesitate to buy ore under unsettled conditions of the copper market. Labor unrest and price uncertainty, if continued long, may so retard production as to create the shortage predicted in some quarters.

Exports from the United States for the first half of the year amounted to 595,353,920 pounds; domestic consumption for that period is estimated at 660,000,000 pounds, making an absorption of 1,255,353,920 pounds of our copper stocks for the first half of 1917. The output of copper from our refineries for that period was 1,055,000,000 pounds, or 200,353,920 pounds less than was absorbed. This shows a rapid depletion of accumulated stocks, which, in the face of an enforced curtailment of production, further emphasize a probable shortage. In the meantime, if a price should be fixed at such a figure as to make lower wages necessary, without a corresponding reduction of food prices, labor conditions again would be unsettled and menacing.

Montana Smelters Close Down.

Smelters of Anaconda Copper Mining Company, at Anaconda and Great Falls, Mont., have ceased to operate, as the result of a walk-out of its employees, who, it is reported, demanded $6 per day for six hours' work. Cessation of mining operations, it is said, will follow. The company began the year with a production of 28,250,000 pounds of copper per month, and the shut-down means normally a diminution of the current supply to that extent. This action affects 15,000 men on the company's payroll, and will seriously curtail the use of electric power, supplied by Montana Power Company, for mill work, ore-haulage and mining operations.

In Arizona, the Old Dominion's furnaces at Globe have been blown in; the Inspiration and Miami, at Miami, are reported ready to resume operation; the Copper Queen and Calumet & Arizona smelters at Douglas are increasing their operations to some extent; the Detroit Copper Company, Arizona Copper Company and Shannon Copper Company, situated in Clifton-Morenci district, and each having a smelting plant, are reported inactive. The July loss in copper production for that state amounted to 35,000,000 pounds, that of August some less.

WEEKLY COMPARISONS OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate Per cent.	Bid Aug. 21.	Bid Aug. 28.
Adirondack Electric Power of Glens Falls, common	..	18	17
Adirondack Electric Power of Glens Falls, preferred	6	72	70
American Gas & Electric of New York, common	10+extra	110	113
American Gas & Electric of New York, preferred	6	47½	47½
American Light & Traction of New York, common	..	290	285
American Light & Traction of New York, preferred	6	107	106
American Power & Light of New York, common	4	65	60
American Power & Light of New York, preferred	6	85	80
American Public Utilities of Grand Rapids, common	..	28	28
American Public Utilities of Grand Rapids, preferred	6	63	63
American Telephone & Telegraph of New York	..	119⅛	117¾
American Water Works & Elec. of New York, common	..	7½	7
American Water Works & Elec. of New York, particip.	7	20	20
American Water Works & Elec. of New York, first preferred	..	67	68
Appalachian Power of Bluefield, common	..	4	4
Appalachian Power of Bluefield, preferred	7	30	28
Cities Service of New York, common	6+extra	274	265
Cities Service of New York, preferred	8	84¾	84
Commonwealth Edison of Chicago	8	117	117¼
Comm. Power, Railway & Light of Jackson, common	4	48	48
Comm. Power, Railway & Light of Jackson, preferred	6	76	76
Federal Light & Traction of New York, common	..	12½	10
Federal Light & Traction of New York, preferred	..	48	48
Illinois Northern Utilities of Dixon	6	77	77
Middle West Utilities of Chicago, common	2+2 extra	36	36
Middle West Utilities of Chicago, preferred	6	†68	69
Northern States Power of Chicago, common	7	89	87
Northern States Power of Chicago, preferred	7	96½	96½
Pacific Gas & Electric of San Francisco, common	5	54	53½
Pacific Gas & Electric of San Francisco, preferred	6	88	87
Public Service of Northern Illinois, Chicago, common	7	85	87½
Public Service of Northern Illinois, Chicago, preferred	6	94	93½
Republic Railway & Light of Youngstown, common	4	33¼	34
Republic Railway & Light of Youngstown, preferred	6	65	64
Standard Gas & Electric of Chicago, common	..	9½	9
Standard Gas & Electric of Chicago, preferred	6	35	34
Tennessee Railway, Light & Power of Chattanooga, common	..	5	5
Tennessee Railway, Light & Power of Chattanooga, preferred	6	28½	28
United Light & Railways of Grand Rapids, common	4	38	38
United Light & Railways of Grand Rapids, preferred	6	70½	70
Western Power of San Francisco, common	..	14	14
Western Power of San Francisco, preferred	6	55	54½
Western Union Telegraph of New York	extra	93¼	92⅞
Industrials—			
Electric Storage of Philadelphia, common	4	59	59½
General Electric of Schenectady	8	152	150½
National Carbon of Cleveland, common	8	81½	*79
National Carbon of Cleveland, preferred	..	*130¾	*130
Westinghouse Electric & Mfg. of Pittsburgh, common	5+extra	47⅞	45
Westinghouse Electric & Mfg. of Pittsburgh, preferred	7	65	65

*Last sale.

†Ex-dividend.